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**Self-As-Context in Chronic Pain
Examination of a Component Process of Psychological Flexibility**

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King's College London
Institute of Psychiatry, Psychology and Neuroscience
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**Self-As-Context in Chronic Pain: Examination of a
Component Process of Psychological Flexibility**

By Lin Yu

Thesis incorporating publications submitted for the degree of Doctor of

Philosophy of the University of London

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Abstract

Sense of self appears to be fundamental to human wellbeing. Previous research suggests that people with chronic pain perceive threats to their sense of self and struggle with self-related experiences. This struggling may have detrimental effect on their functioning and wellbeing. This thesis investigates the self, in particular a component process called self-as-context within the framework of psychological flexibility (PF) and Acceptance and Commitment Therapy (ACT).

Study 1: A systematic review examined the conceptualization, methods, and evidence from empirical investigations of the self in chronic pain. These investigations of the self appear to lack theoretical clarity. A model of the self, based in the PF model and ACT, was suggested for future research on the self.

Study 2: Evidence from the model of self was lacking partly due to lack of adequate measurement. In study 2 a measure of the self based on this model of the self, called the Self Experiences Questionnaire (SEQ) was developed in a chronic pain sample. The results of this study suggest that the SEQ appears to be a reliable and valid measure of self-as-context.

Study 3: In study 3 self-as-context was investigated using the SEQ with a longitudinal, single-group design, in the setting of an ACT-oriented multidisciplinary programme for chronic pain. Process variables and outcomes variables were measured at pre-treatment, upon completion of treatment, and at nine-month follow-up. Increase in self-as-context from pre- to post-treatment was associated with improvement in functioning from pre-treatment to follow-up.

Study 4: In study 4 the feasibility of an online experiment protocol for the examination of the impact of self-as-context on avoidance behaviour was tested. The recruitment and technical delivery were successful, and retention and data completion were only marginally successful. This online experiment protocol appears to be partially feasible.

This set of projects produced a synthesis of evidence related to self in chronic pain, a tool for the investigation of self-as-context, and provided preliminary evidence for change in self-as-context in

relation to treatment outcomes in people with chronic pain. This effort may facilitate empirical and clinical investigation of the self in people with chronic pain, improve our understanding of the self, and inform treatment development.

Table of Contents

ABSTRACT.....	2
TABLE OF CONTENTS.....	4
TABLE OF FIGURES	8
TABLE OF TABLES	9
ACKNOWLEDGEMENTS	10
ABBREVIATIONS	11
CHAPTER 1 THE PROBLEM OF CHRONIC PAIN	12
1.1 INTRODUCTION	12
1.2 PREVALENCE OF CHRONIC PAIN	12
1.3 IMPACT OF CHRONIC PAIN	13
1.3.1 Individual Impact of Chronic Pain	13
1.3.2 Socioeconomic Impact of Chronic Pain	14
1.4 TREATMENT OF CHRONIC PAIN	14
1.5 SUMMARY	16
CHAPTER 2 PSYCHOLOGICAL APPROACHES TO CHRONIC PAIN	17
2.1 INTRODUCTION	17
2.2 AN OPERANT APPROACH TO CHRONIC PAIN	17
2.2.1 A Brief Description of Operant Approach to Chronic Pain	17
2.2.2 The Record of the Operant Approach to Chronic Pain	19
2.3 A COGNITIVE BEHAVIOURAL APPROACH TO CHRONIC PAIN	20
2.3.1 A Brief Description of Cognitive Behavioural Approach to Chronic Pain.....	20
2.3.2 The Record of the Cognitive Behavioural Approach to Chronic Pain	21
2.3.3 A Brief Description of the Fear-Avoidance Model	21
2.3.4 The Record of the Fear Avoidance Model	22
2.4 A CONTEXTUAL COGNITIVE BEHAVIOURAL APPROACH TO CHRONIC PAIN	22
2.4.1 A Brief Description of Contextual Cognitive Behavioural Approach to Chronic Pain	22

2.4.2 Psychological Flexibility and Acceptance and Commitment Therapy.....	23
2.4.3 The Record of Contextual Interventions.....	24
2.4.4 The Record of ACT in Chronic Pain	25
2.5 SUMMARY	26
CHAPTER 3 PSYCHOLOGICAL APPROACHES TO THE SELF	27
3.1 INTRODUCTION	27
3.2 EARLY THEORIES ON THE SELF	27
3.2.1 William James	27
3.2.2 Charles Cooley	28
3.2.3 George Herbert Mead	28
3.2.4 The Self in Humanistic Psychology.....	28
3.2.5 Summary of Early Approaches.....	29
3.3 RECENT MAINSTREAM APPROACHES TO THE SELF	29
3.3.1 The Self in Developmental Psychology	29
3.3.2 The Self in Cognitive Psychology and Neuroscience.....	31
3.3.3 The Self in Social Constructionism	35
3.4 TRADITIONAL BEHAVIOURAL ANALYTIC APPROACHES TO THE SELF	36
3.5 THE PHILOSOPHIC ASSUMPTIONS BEHIND PSYCHOLOGICAL APPROACHES TO THE SELF	37
3.6 SUMMARY	38
CHAPTER 4 A CONTEMPORARY CONTEXTUAL BEHAVIOURAL APPROACH TO THE SELF	41
4.1 INTRODUCTION	41
4.2 FUNCTIONAL CONTEXTUALISM	41
4.3 A CONTEXTUAL BEHAVIOURAL APPROACH TO THE SELF	42
4.3.1 Relational Frame Theory.....	42
4.3.2 Verbal Self-discrimination and self-awareness.....	43
4.3.3 Perspective-taking	44
4.3.4 The Three Selves.....	45
4.4 SUMMARY	48
CHAPTER 5 A SYSTEMATIC REVIEW OF THE INVESTIGATION OF THE SELF IN CHRONIC PAIN.....	51

5.1 CHAPTER OVERVIEW	51
5.2 PUBLISHED ARTICLE	52
CHAPTER 6 PRELIMINARY ANALYSES FOR A MEASURE OF SELF: THE SELF EXPERIENCES QUESTIONNAIRE (SEQ).....	
	88
6.1 CHAPTER OVERVIEW	88
6.2 PUBLISHES ARTICLE.....	89
CHAPTER 7 INVESTIGATION OF THE ASSOCIATION BETWEEN CHANGE IN “SELF-AS-CONTEXT” AND IMPROVEMENT IN FUNCTIONING IN PEOPLE WITH CHRONIC PAIN	
	107
7.1 CHAPTER OVERVIEW	107
7.2 PUBLISHED ARTICLE	108
CHAPTER 8 A FEASIBILITY STUDY OF INTERNET-BASED EMPIRICAL INVESTIGATION OF “SELF-AS-CONTEXT” IN PEOPLE WITH FIBROMYALGIA	
	131
8.1 CHAPTER OVERVIEW	131
8.2 INTRODUCTION	131
8.3 METHODS.....	133
8.3.1 Design	133
8.3.2 Participants.....	133
8.3.3 Materials.....	134
8.3.4 Procedure	136
8.3.5 Analysis	137
8.4 RESULTS	138
8.5 DISCUSSION	142
CHAPTER 9 DISCUSSION	
	145
9.1 CHAPTER OVERVIEW	145
9.2 SUMMARY OF MAIN FINDINGS.....	145
9.2.1 Study 1: Systematic review.....	146
9.2.2 Study 2: Measure development	147
9.2.3 Study 3: Treatment process analysis	147

9.2.4 Study 4: Online experiment	148
9.3 CONTRIBUTION TO LITERATURE	148
9.4 THEORETICAL AND CLINICAL IMPLICATIONS.....	149
9.5 LIMITATIONS	151
9.6 CONCLUSION	152
APPENDIX A. SEARCH STRATEGY FOR SYSTEMATIC REVIEW	153
APPENDIX B. STUDY QUALITY ASSESSMENT TOOL.....	154
APPENDIX C. TABLE OF CHARACTERISTICS OF STUDIES	156
APPENDIX D. CRITERIA FOR QUESTIONNAIRE ASSESSMENT	170
APPENDIX E. ASSESSMENT PACKAGE IN STUDY 2 & STUDY 3.....	172
APPENDIX F. INFORMATION SHEET FOR PARTICIPANTS.....	184
APPENDIX G. CONSENT FORM FOR PARTICIPANTS	185
APPENDIX H. SCRIPT FOR TRAININGS IN STUDY 4	187

Table of Figures

Figure 1. Conceptualization of the three selves as perspective-taking relations (Foody, Barnes-Holmes, & Barnes-Holmes, 2012)	46
Figure 2. Flow of participants through study diagram	134
Figure 3. Mean SAC per condition with participants who completed the experiment.	141

Table of Tables

Table 1 Baseline scores including gender, age, pain, and SAC, by randomization and attrition	139
Table 2 Means and standard deviations of SAC and distress at baseline and post distress exposure in each condition, and difference between two conditions at post distress exposure	140

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Abbreviations

Abbreviation	Meaning
ACT	Acceptance and Commitment Therapy
BDI	Beck Depression Inventory
BPI	Brief Pain Inventory
CAQ	Committed Action Questionnaire
CBS	Contextual Behavioural Science
CBT	Cognitive Behavioural Therapy
CES-D	Center for Epidemiological Studies Depression Scale
CPAQ-8	Chronic Pain Acceptance Questionnaire-8
CS	Contextual Self
CS	Control and Suppression
CWP	Chronic Widespread Pain
DASS	Depression Anxiety Stress Scales
EQ	Experiences Questionnaire
FAB	Fear-Avoidance Beliefs
FIQ	Fibromyalgia Impact Questionnaire
FM	Fibromyalgia
fMRI	Functional Magnetic Resonance Imaging
GHQ-28	General Health Questionnaire-28
HADS	Hospital Anxiety and Depression Scale
ICC	Intraclass Correlation Coefficient
IFA	Item Factor Analyses
IRT	Item Response Theory
LASB	Local Anaesthetic Sympathetic Blockade
MPI	Multidimensional Pain Inventory
NSAIDs	Non-Steroidal Anti-Inflammatory Drugs
PDI	Pain Disability Index
PDQ	Pain Disability Questionnaire
PET	Positron Emission Tomography
PF	Psychological Flexibility
PHQ-9	Patient Health Questionnaire-9
PNAS	Positive and Negative Affect Scale
RCT	Randomised Controlled Trial
RFT	Relational Frame Theory
rTMS	Repetitive Transcranial Magnetic Stimulation
SAC	Self As Context
SEQ	Self Experiences Questionnaire
SIP	Sickness Impact Profile
SMD	Standardized Mean Difference
STAI-T	State-Trait Anxiety Inventory- Trait
VAS	Visual Analogue Scale
WSAS	Work and Social Adjustment Scale

Chapter 1 The Problem of Chronic Pain

1.1 Introduction

The International Association for the Study of Pain (IASP) defines chronic pain as pain that has persisted beyond the normal tissue healing time (usually taken to be 3 months) (International Association for the Study of Pain, 1986). Chronic pain may arise from an initial injury, an on-going illness, or no clear cause. It is a very common problem. Not only does chronic pain cause significant individual suffering, it also has great, adverse, social and economic impacts (Breivik, Collett, Ventafridda, Cohen, & Gallacher, 2006; Breivik, Eisenberg, & O'Brien, 2013).

1.2 Prevalence of Chronic pain

Chronic pain is a global health problem (Goldberg, & McGee, 2011). In a World Health Organisation (WHO) study (Gureje, Von Korff, Simon, & Gater, 1998), persistent pain was surveyed in fifteen primary care centres across cultures. It was reported overall that 22% of primary care patients reported persistent pain, with a range from 5.5% to 33.0% across centres. In a recent systematic review of the prevalence of chronic widespread pain (CWP) in the general population, thirty-two prevalence estimates, including populations from Europe, Asia, USA, Canada, Russia, Brazil, and New Zealand, were identified and included in the meta-analysis (Mansfield, Sim, Jordan, & Jordan, 2016). The pooled estimate suggested that one in ten adults suffered from CWP, with prevalence twice as high in women as in men, and higher in those aged over forty. In Europe (Breivik et al., 2006), one in five adults suffers from moderate to severe chronic pain, with the prevalence varying from 12% to 30% among sixteen European countries and Israel. In the UK, a recent systematic review (Fayaz, Croft, Langford, Donaldson, & Jones, 2016), identified an estimated prevalence of chronic pain, derived from seven studies, ranging from 35.0% to 51.3%, with pooled estimated mean of 43.5%. There was a tendency for higher prevalence in older people, with 14.3% in 18–25 years old, to 62% in those aged over 75. Chronic pain was also more common in women than in men. In low- and middle- income countries (Jackson et al., 2016), the prevalence of chronic pain in the general population was estimated to be 4% to 42%, depending upon pain sites.

Back pain and joint pain are typically among the most common forms of chronic pain. In Europe, close to half of all pain sufferers report back pain and over 40% report joint pain, followed by other forms of pain such as neck pain, and arthritis pain (Breivik et al., 2006; Margarit, n.d.). In low- and middle-income countries, these values appear to be lower, with 21% for low back pain, 14% for joint pain, and the overall prevalence of musculoskeletal pain estimated at 25% (Jackson et al., 2016).

Prevalence estimates are not always consistent. Indeed these epidemiological studies do not always adopt the same definition for chronic pain, regarding pain duration, pain intensity, and pain sites. For instance, some studies adopted a three-month cut-off for pain duration (e.g. Harstall & Ospina, 2003), while others adopted a cut-off of six-month (e.g. Mansfield et al., 2016). Other factors such as sampling methods, including setting and geographical location, also vary vastly across studies. These differences may contribute to the variance in prevalence estimates. Nevertheless, overall data suggested a high global prevalence of chronic pain, with higher prevalence in female and older people. Still, no matter how it is defined, where it is studied, or whether one is a man or woman, or working age or older, chronic pain is a remarkably prevalent human experience.

1.3 Impact of Chronic Pain

1.3.1 Individual Impact of Chronic Pain

Evidence shows that chronic pain has numerous detrimental effects on physical and psychological wellbeing, and creates severe impairment in quality of life and work in pain sufferers (Azevedo, Costa-Pereira, Mendonça, Dias, & Castro-Lopes, 2012; Boonstra, Reneman, Stewart, Post, & Preuper, 2013; Fernández-de-las-Peñas et al., 2011; Fredheim et al., 2008; Løyland, Miaskowski, Paul, Dahl, & Rustøen, 2010). A WHO survey of persistent pain in primary care (Gureje et al, 1998) reported that relative to patients without persistent pain, pain sufferers were more likely to have an anxiety or depressive disorder (adjusted odds ratio [OR], 4.14), to experience significant activity limitations (adjusted OR, 1.63), and to have unfavorable health perceptions (adjusted OR, 1.26). In a large-scale survey in Europe (Breivik et al., 2006), it was reported that between 40% and 56% respondents reported a specific activity limitation due to chronic pain. 27% respondents reported being less able or no longer able to maintain relationships, and 48% less able or no longer able to attend social activities. Respondents also reported increased fatigue (50%), helplessness (43%), and loneliness (28%) due to pain, as well as decreased

concentration (44%) and functioning (40%). 61% of the respondents reported that they were less able or no longer able to work outside the home, 19% lost their job, 13% changed jobs, and 16% changed job responsibility due to pain. In addition, chronic pain sufferers reportedly face a constant daily struggle to affirm their self, reconstruct a sense of self, find an explanation, and successfully navigate the health-care system (Toye et al., 2013).

1.3.2 Socioeconomic Impact of Chronic Pain

Chronic pain can carry significant socioeconomic impacts (Breivik, Eisenberg, & O'Brien, 2013). Secondary economic problems, from the perspective of society, include lost work productivity and increased health-related costs for industry or employers (Latham & Davis, 1994). Data shows enormous direct health care costs, and indirect costs including lower productivity due to chronic pain (Gaskin & Richard, 2012; Gustavsson et al., 2012; Raftery et al., 2012). In Europe, national economic costs of conditions related to chronic pain have reached billions of euros annually which represent 3-10% of GDP, including 50% direct healthcare costs and 50% indirect costs (Breivik et al., 2013). For instance, the total national cost due to chronic pain was estimated to be €5.34 billion with 52% direct healthcare in Ireland (Raftery et al., 2012), and €32 billion with 41% direct healthcare in Sweden (Gustavsson et al., 2012). In the United States, the total cost due to pain was estimated to be \$560- \$635 billion, with again a roughly 50/50 split between excess healthcare costs relative to lost productivity (Gaskin & Richard, 2012). These data collectively demonstrate the tremendous socioeconomic burden of chronic pain.

1.4 Treatment of Chronic Pain

The most commonly used treatment modalities for people with chronic pain include pharmacological treatments (e.g. opioids, non-steroidal anti-inflammatory drugs, antidepressant drugs, anticonvulsant drugs, skeletal muscle relaxants, and topical agents), interventional treatments (e.g. injection therapy, surgery, and implantable devices), physical, rehabilitation, and psychological approaches, complementary and alternative medicines, and other non-pharmacological approaches (e.g. spinal manipulation, massage, acupuncture, and Transcutaneous electric nerve stimulation). Despite the variety in treatment modality, treatments for chronic pain clearly appear insufficient (Kress, 2012). In Europe, 31% of the pain sufferers were not receiving any treatment for their pain (Breivik et al., 2006). Among those who were receiving treatment, most (70%) were seeing their general practitioner (GP),

and only 2% were treated by a pain management specialist. Regarding the format of treatment, about 80% of the pain sufferers have been treated with non-prescription or prescription drugs for their pain. Many forms of non-drug treatments also are used, including massage (30%), physical therapy (21%), acupuncture (13%), heat (9%), exercise (8%), transcutaneous electrical nerve stimulation (5%), relaxation therapy (4%), diet (3%), cold (3%), herbal treatment (3%), and counselling (2%).

In a review published in the *Lancet*, Turk and colleagues (2011) reviewed the most commonly used interventions for the management of chronic non-cancer pain. According to their review, these treatments provide only limited relief from pain. Small to moderate improvements in symptom and functioning were observed for some pharmacological treatments, with side effects, and risk of misuse reported. Some interventional treatments were effective for certain types of chronic pain conditions, but evidence was very limited, and potentially severe adverse events resulting from invasive intervention were reported. Benefit of psychological treatments alone was reported to be modest. The efficacy of complementary and alternative medicines remains unclear. Interdisciplinary pain rehabilitative programmes reportedly showed evidence for individual and socioeconomic benefits, including reduction in pain (Hoffman, Papas, Chatkoff, & Kerns, 2007), improvement in physical functioning, reduction in healthcare use, as well as reduction in welfare costs (Thomsen, Sørensen, Sjøgren, & Eriksen, 2002).

Some recent reviews examined evidence for some specific treatments including pharmacological treatments (Chou et al., 2015; Derry, Conaghan, Da Silva, Wiffen, & Moore, 2016), interventional treatments (O'Connell et al., 2016), physiotherapy (Smart, Wand, & O'Connell, 2016), and other non-pharmacological approaches (O'Connell, Wand, Marston, Spencer, & DeSouza, 2014). Overall the lack of high-quality evidence was identified in these studies, and firm conclusions on the effectiveness and side effects of these treatments have not been drawn. For instance, a systematic review of long-term opioid therapy suggested the insufficiency of evidence for the effectiveness of long-term opioid therapy in improving chronic pain and function (Chou et al., 2015). A systematic review of topical non-steroidal anti-inflammatory drugs (NSAIDs) for chronic musculoskeletal pain (Derry et al., 2016) suggested the effectiveness of some topical NSAIDs in pain reduction for a minority of people in osteoarthritis in short term (6-10 weeks). This review also suggested the lack of evidence for other chronic pain conditions.

One systematic review of local anaesthetic sympathetic blockade (LASB) for complex regional pain syndrome (O'Connell et al., 2016) suggested that the limited data available did not indicate the effectiveness of LASB for reducing pain in CRPS. And Minor side effects were reported. One systematic review of non-invasive brain stimulation techniques for chronic pain (O'Connell et al., 2014) suggested short-term effects on pain for single doses of high-frequency Repetitive Transcranial Magnetic Stimulation (rTMS), but not for multiple doses or low-frequency rTMS, and the effect did not reach clinical significance. A systematic review of physiotherapy for pain and disability in adults with complex regional pain syndrome (Smart et al., 2016) suggested that graded motor imagery and mirror therapy might provide clinically meaningful improvements in pain and function. But evidence for the effectiveness of multimodal physiotherapy, electrotherapy and manual lymphatic drainage was generally absent or unclear. One systematic review of aquatic exercise training for fibromyalgia (Bidonde et al., 2014) suggested beneficial effect of the training for improving wellness, symptoms, and fitness in adults with fibromyalgia.

1.5 Summary

Chronic pain is major global health care problem. It creates significant individual suffering and enormous economic burden. Data from epidemiological studies suggests high prevalence of chronic pain, and potential links with female sex and with age. The variation of prevalence estimates across regions may also imply the role of social factors such as health care system, workplace environment, and culturally different perceptions of chronic pain, amongst others. Further investigation of these factors is ongoing and needed to understand the development of chronic pain, and to inform therapeutic efforts and public health policy-making. Regardless of its global prevalence, the treatment needs of chronic pain are obviously insufficiently addressed. In addition, high-quality evidence for the effectiveness and side effects of these treatments applied to chronic pain is lacking. Nevertheless, the need for prioritizing chronic pain as a major health problem is clear.

Chapter 2 Psychological Approaches to Chronic Pain

2.1 Introduction

During most of modern times pain has been viewed from a predominantly biomedical perspective, by the people who experience it, the people who treat them, and the people who study it. In this view, pain is a symptom of some underlying pathology. The diagnostic aim was to identify the presumed underlying pathology, and treatment was targeted at modifying the underlying pathology, with the aim to eliminate or reduce the pain, if possible. By the turn of the 20th century the term “psychogenic pain” appeared, and psychologists began to recognize emotional aspects of pain, and thus psychology as we understand it today began to apply itself to the problem of pain, particularly intractable pain (Binswanger, 1904; Titchener, 1908). However, no significant application of psychological principles appeared until the quite radical shift that emerged from the work of Wilbert “Bill” Fordyce (1976) and his proposal of a behavioural model of pain. Today, the main clinical principles and methods adopted by psychologists and multidisciplinary teams stem primarily from two frameworks, that is, an operant approach, as first introduced by Fordyce, and a cognitive behavioural approach. Some current approaches based on many of the same roots and principles of these earlier approaches can be called a “contextual cognitive behavioural” approach as well.

2.2 An Operant Approach to Chronic Pain

2.2.1 A Brief Description of Operant Approach to Chronic Pain

While the biomedical model of pain focuses on pain symptoms, the operant approach focuses on “pain behaviour” (Fordyce, 1968; 1973). Fordyce (1968) first suggested this emphasis on the observable phenomena of pain, essentially consisting of signals emerging from people with chronic pain and indicating to observers the presence of the pain experience. Verbal complaints, moans, grimaces, assuming a posture to minimize pain, seeking help from others, and asking for pain medication are among many other forms of pain signals. According to Fordyce and colleagues (1968), “The combination of the visible and auditory pain signals sent by the patient and the immediately ensuing behaviours in which he engages relating to the pain signal will be subsumed under the term, ‘pain behaviour’” (p. 179). According to Fordyce (1982), pain behaviours, whether in the form of sounds, speech, or action, are behaviours, and are subject to the same influences as other kinds of behaviours. In behaviour

analytic term, pain behaviours are operants (Skinner, 1953). As operants, pain behaviours are sensitive to learning/conditioning effects through contingent reinforcement. Pain behaviours might initially be elicited by an antecedent stimulus, such as sensations arising from tissue damage, and once emitted may come under control of consequences, hence emerging as operants. Once behaviour is systematically under the control of consequences, the role of the initial eliciting stimulus may disappear, and at this point the operant control is exclusive. In other words, a pain sufferer's pain may have begun as result of pathological changes in tissue. However, if his or her pain behaviours were systematically reinforced during time of injury or disease, these pain behaviours are likely to persist, beyond healing time and after the disappearance of the injury or disease, if the positive reinforcement maintains them.

This behavioural model of pain emphasizes the influence from environmental factors or social influence. When pain behaviours occur, people around the pain sufferer are likely to respond to his or her pain signals. For instance, they may take actions to alleviate the patient's pain. A parent may express worries and console a child in pain, a partner may help with tasks or responsibilities, and a physician may prescribe medication for the patient in pain. These favourable consequences of the pain behaviours, such as the attention from parent, assistance, and relief from medication, may positively reinforce those pain behaviours. Therefore, it is possible that the frequency of those pain behaviours could increase. People around the pain sufferer may observe responses from him or her, as consequences of their help, such as gratitude and relief from the sufferer whom they care about, which may in turn positively reinforce their helping behaviours or responses towards those pain behaviours. On the other hand, the pain sufferer's "well behaviours," such as working and exercising, may not be systematically reinforced anymore, as result of his or her avoidance of such well behaviours that may elicit pain, and it is possible that the rate of these well behaviours could diminish. It is these relations between pain behaviours and environmental responses to them that allow the analysis within the framework of operant conditioning.

According to Fordyce (1982), conditioning may influence pain behaviours in two primary ways. One way is through direct positive reinforcement. When pain behaviours are emitted, again, they may be followed by reinforcing consequences in a contingent fashion. A good example of direct positive reinforcement is the influence of social reinforcement as discussed above. Another way through which conditioning influences pain behaviours is what is termed as "avoidance learning". Fordyce (1982)

defined avoidance learning as “behaviours, which serve either to escape a noxious stimulus, or to avoid or postpone a noxious stimulus (p. 319).” For instance, when a pain sufferer is in pain, he or she may take sick leave. In turn not going to work may spare him or her from dealing with a stressful work task. This refraining from attending work is then negatively reinforced.

This behavioural model of pain implies the application of learning or behavioural modification principles to chronic pain management. Fordyce and colleagues developed then innovative techniques based on operant principles in chronic pain management programmes. For instance, systematic management of (time-contingent) medication delivery was used to reduce potentially unhelpful conditioning effects. Spouses were educated and involved in a helping role to reduce reinforcing social influences on patients’ pain behaviours. Patients’ pain behaviours were exposed to therapeutically manipulated consequences (e.g. clinicians were instructed to ignore pain behaviours and to praise well behaviours.) with the aim of extinction of pain behaviours and reinforcement of well behaviours.

2.2.2 The Record of the Operant Approach to Chronic Pain

In an early case study by Fordyce and colleagues (1968), reduction in medication intake and increase in activity level were observed upon completion of treatment. In a later study with a group of thirty-six participants (Fordyce et al., 1973), reduction in medication intake, and increase in activity level were similarly observed upon completion of treatment, and at follow-up. In a study with control group (Cairns & Pasino, 1977), patients in experimental group received contingent verbal reinforcement from the physical therapist for increase in measured activity; control group received feedback in form of graph of daily activity level. Significant increase in activity level was only observed in experimental condition. In a longitudinal study with untreated comparison groups (Roberts & Reinhardt, 1980), 77% of the treated participants were reported functioning normally without pain medications from one to eight years following completion of the eight-week inpatient treatment. More treated participants reported paid employment, and treated participants reported fewer hospitalizations related to pain and less pain-related interference at follow-up.

In a more recent longitudinal investigation of group behavioural therapy in low back pain (Turner, Clancy, McQuade, & Cardenas, 1990), an aerobic exercise condition, and waiting-list condition were

included. Compared to waiting list controls, patients who received behavioural therapy including aerobic exercise showed significantly greater improvement in self-reported and observer-rated measures of psychological and physical functioning, upon completion of treatment, but not those who received behavioural therapy or aerobic exercise only. All treated groups maintained improvements at 6-month and 12-month follow-ups. These individual studies appear to suggest the effectiveness of operant approach in reducing pain behaviour and in increasing well behaviour as the model theorizes. In a systematic review of RCTs of psychological treatments for chronic pain (Williams, Eccleston, & Morley, 2012), evidence for the efficacy of behavioural treatments was reportedly insufficient. However, it is notable that the systematic review examined outcomes including pain, disability, mood, and catastrophizing, while the early studies focused on behavioural outcomes including medication use and activity level. Even so, studies of the operant approach have not continued at their initial pace and there is a lack of high quality RCTs addressing this approach as Fordyce conceived it.

2.3 A Cognitive Behavioural Approach to Chronic Pain

2.3.1 A Brief Description of Cognitive Behavioural Approach to Chronic Pain

Cognitive behavioural approach to chronic pain represents a shift from Fordyce's behavioural approach. In 1983, Dennis Turk and colleagues (1983) comprehensively described cognitive behavioural approach to chronic pain, building on the development of cognitive behavioural therapy (CBT) during the previous decade or so. According to the authors, regardless of the variety of ways in which cognitive behavioural approaches are implemented, these approaches share the same basic underlying assumption, which is "affect and behaviour are largely determined by the way in which the individual construes the world (p. 4)". Accordingly, "therapy is designed to help the patient identify, reality-test, and correct maladaptive, distorted conceptualization and dysfunctional beliefs." Distinctive from behavioural approaches, where environmental manipulations are applied for the purpose of changing frequency of behaviour, within cognitive behavioural approaches environmental manipulations represent informational feedback trials. These informational feedback trials "provide an opportunity for the patient to question, reappraise, and acquire self-control over maladaptive cognitions, feelings, and behaviours (p. 5)."

Turk and colleagues (1983) provided a comprehensive and detailed description of cognitive behavioural treatment. The treatment generally involves three stages. First stage includes initial contact through

assessment to reorient the patient and to form therapeutic alliance. Following initial assessment and reconceptualization, the treatment proceeds onto skills acquisition and consolidation, and finally application of skills where needed. From a cognitive behavioural perspective, cognitive processes, such as attention and appraisals, exert major impacts on adjustment among chronic pain patients. The methods within this approach rely heavily on using cognitive strategies to alter these processes (Turner & Jensen, 1993). Cognitive behavioural treatments usually include methods developed originally as operant treatments, such as strategies for decreasing avoidance, quota-based approaches to exercises, behavioural activation, and some work with spouse and family members (McCracken, 2005). Additional methods such as relaxation, biofeedback, cognitive restructuring, self-statement analysis, and various cognitive coping strategies are also included.

2.3.2 The Record of the Cognitive Behavioural Approach to Chronic Pain

Reviews of treatment packages incorporating various methods generally suggested the effectiveness of behavioural cognitive treatments (e.g. Eccleston, Williams, & Morley, 2009; Morley, Eccleston, & Williams, 1999). In a most updated review of psychological treatments for chronic pain (excluding headache) (Williams et al., 2012), 35 studies were identified and included in meta-analyses. It was reported that, when compared with treatment as usual/waiting list control condition, CBT produced a small to moderate effect on pain, disability, mood and catastrophising immediately after treatment, but effects on most of the outcomes disappeared at follow-up. When compared with active controls, CBT has small effects on disability and catastrophising, but not on pain or mood. Nevertheless, these records showed an overall success of cognitive behavioural treatments to chronic pain, albeit to a limited degree.

2.3.3 A Brief Description of the Fear-Avoidance Model

Within cognitive behavioural approaches, the fear-avoidance model drew great deal of attention, and many studies have been conducted investigating chronic pain based on this model (Lethem et al., 1983; Phillips, 1987; Vlaeyen & Linton, 2000). The basic assumption of the fear avoidance model is that the way in which pain is interpreted may lead to one of two different pathways. According to this model, when acute pain is perceived as non-threatening, patients are likely to remain engaged in daily activities, which can facilitate functional recovery. On the other hand, when acute pain is perceived as

threatening (pain catastrophising), this interpretation may give rise to pain-related fear, which may lead to avoidance behaviours and hyper-vigilance to bodily sensations, followed by disruption of functioning, such as disuse, disability, and depression (Vlaeyen & Linton, 2000).

2.3.4 The Record of the Fear Avoidance Model

Numerous studies have focused on the relationships between the separate components of the fear avoidance model. Leeuw and colleagues (2007) reviewed the related evidence. Associations were reported for pain with disability, (e.g. Boersma and Linton, 2005a; Leeuw et al., 2007), pain catastrophising with pain disability (e.g. Peters, Vlaeyen, & Weber, 2005; Sullivan, Lynch, & Clark, 2005), and excessive attention with pain and pain-related fear (e.g. Crombez, & Van Damme, 2004; Goubert, Keogh, Ellery, Hunt, & Hannent, 2001). Pain-related fear was reportedly associated with disability (e.g. Boersman and Linton, 2005b; Goubert, Crombez, & Lysens, 2005), intensified pain (e.g. Buer and Linton, 2002; Turner, Mancl, & Aaron, 2004), as well as pain-related fear and escape/avoidance behaviour (e.g. Al-Obaidi, Al-Zoabi, Al-Shuwaie, Al-Zaabie, & Nelson, 2003; Goubert et al., 2005). A systematic review summarised evidence from fear-avoidance beliefs (FAB) as moderator of treatment efficacy in people with low back pain (Wertli et al., 2014). Here it was reported that FAB influences treatment effects in patients with low back pain of less than 6 months duration. Moderate evidence was reported showing the association of decreases in FAB during treatment with less pain and disability at follow-up. However results from chronic low back pain patients were inconsistent. Overall data appear to suggest the relationships between the components of the fear-avoidance models. On the other hand evidence from mediation analyses with regard to the development of chronic pain as hypothesized in the model is relatively lacking.

2.4 A Contextual Cognitive Behavioural Approach to Chronic Pain

2.4.1 A Brief Description of Contextual Cognitive Behavioural Approach to Chronic Pain

Contextual cognitive behavioural approach stems from the worldview of Functional Contextualism. From the Functional Contextual point of view, behavioural events are interpreted as on-going acts understandable within their current situational and past historical context. This will be further discussed in Chapter 4. Briefly, from a functional contextual point of view, psychological events, such as thoughts and feelings do not cause other actions by themselves. Rather, they participate in processes of

behaviour influence based on their historically and situationally defined context. In other words, the content of thoughts and feelings is not a problem, unless the context leads this content to regulate actions in a way that undermines one's goals and values (Hayes, Luoma, Bond, Masuda, & Lillis, 2006). Hence contextual cognitive behavioural approach does not focus on creating change in the content of thoughts and feelings, but instead on changing "the individual's relation to" thoughts and feelings. This is a defining feature of contextual cognitive behavioural approach with broad implications for the development and delivery of treatment.

Contextual interventions, within this approach, have been applied to chronic pain. Instead of focusing on controlling or fighting against pain, contextual interventions focus on the acceptance of pain. One form of contextual intervention is mindfulness-based treatments. The essential feature of mindfulness is intentional and non-judgmental present moment awareness (Kabat-Zinn, 1990). Mindfulness-based interventions often involve exercises such as meditation practice, yoga, and exercising mindfulness in everyday life (Kabat-Zinn, 1990). Another form of contextual cognitive behavioural intervention is Acceptance and Commitment Therapy (ACT; Hayes, Strosahl, & Wilson, 2006), which will be discussed in detail in the following section.

2.4.2 Psychological Flexibility and Acceptance and Commitment Therapy

ACT is not a set of techniques, rather an orientation to psychotherapy guided by the psychological flexibility (PF) model (Hayes, Strosahl, & Wilson, 2011). PF is the ability to "contact the moment as a conscious human being more fully as it is, not as what it says it is, and based on what the situation affords, persisting or changing in behaviour in the service of chosen values" (p.187, Hayes, Levin, Plumb-Villardaga, Villatte, & Pistorello, 2013). The therapeutic goal of ACT is to facilitate PF (Hayes et al, 2013). According to the PF model, PF is made up of six core processes, including acceptance, cognitive defusion, being present, self-as-context, values, and committed action. Briefly, acceptance is the willingness to experience undesirable thoughts, feelings, and sensations when doing so serves one's goals. Cognitive defusion entails distancing or separation between the content of one's thoughts and the events described in the thoughts, a process that reduces cognitive influence on behaviours without necessarily changing cognitive content. Being present involves being directly aware of on-going events. Self-as-context entails an experience of taking a perspective, as an observer of one's own psychological

experiences without getting attached to them, needing to defend them as a matter of identity, or to defend against them as if they present a threat. Values are on-going qualities that one defines as important and desired, and that guide one's goals and actions. Committed action is the ability to flexibly persist in actions guided by values, to meet difficulty and to persist again. These processes are also summarized as "open, aware, and active" (Hayes, Villatte, Levin, & Hildebrandt, 2011).

ACT is grounded in basic operant behavioural principles. In a review of ACT for chronic pain (Yu & McCracken, 2016), the authors described the treatment as interventions aimed at diminishing and augmenting the influence of verbal regulation over behaviour to produce less avoidance and more goal-directed action. One way to achieve this is by using "experiential methods" designed to create change in behaviour directly, by allowing actions to contact experience and meet consequences as they emerge naturally in the environment. Exposure-based methods, mindfulness exercises, sensory focusing exercises, role play, direct rehearsal, and methods that use paradox or confusion can operate in this predominantly non-verbal, experience-based, "experiential" fashion. Metaphors are also frequently used. These examples represent a contrast from didactic methods, lecturing, verbal persuasion, or providing information.

2.4.3 The Record of Contextual Interventions

There has been growing evidence in support of the effectiveness of contextual interventions for chronic pain. In a systematic review of contextual, "acceptance-based," treatment for chronic pain (Veehof, Oskam, Schreurs & Bohlmeijer, 2011), nineteen studies were identified and included (9 RCT, 5 clinical controlled studies without randomization, and 5 non-controlled studies). When all studies were included in analysis, significant moderate pooled effect sizes were found for pain, physical wellbeing, depression, anxiety, and quality of life (SMD= .47 to .69). Pooled effect sizes from all controlled studies suggested a significant and small effect on pain, physical wellbeing, depression, anxiety, and quality of life (SMD= .25 to .41). Pooled effect sizes from RCTs showed significant and small effect sizes for pain (SMD= .25) and depression (SMD= .26). Overall results suggested that contextual treatments are good alternatives to traditional CBT. In an update of this review (Veehof, Trompetter, Bohlmeijer & Schreurs, 2016), 25 RCTs were identified and included in main analyses. Significant and small effects were found for pain intensity (SMD=.24), disability (SMD=.40), and depression (SMD=.43), and significant and

moderate effects for and pain interference (SMD= .62) and anxiety (SMD= .51), at post-treatment. A small effect (SMD= .44) was found for quality of life, but did not reach statistical significance. Improvements in all outcomes maintained or increased at follow-up with a small to large effect size (SMD= .41 for pain intensity, SMD=1.05 for pain interference, SMD= .39 for disability, SMD= .53 for depression, SMD= .59 for anxiety, SMD= .66 for quality of life).

2.4.4 The Record of ACT in Chronic Pain

There has been growing body of research suggesting the effectiveness of ACT for chronic pain. In a systematic review of RCTs of ACT for adults with chronic pain, ten trials were identified and included (Hann & McCracken, 2014). Out of the ten between-group comparisons, six showed small to large effect sizes on physical functioning (Buhrman et al., 2013; McCracken, Sato, & Taylor, 2013; Wicksell et al., 2013; Wicksell, Ahlqvist, Bring, Melin, & Olsson, 2008), and two showed significant medium to large effect sizes on pain and global disease impact in fibromyalgia, favouring ACT in each case (Luciano et al., 2014; Wicksell et al., 2013). Nine out of ten comparisons showed significant small to large effect sizes for anxiety, depression, and general emotional distress, favouring ACT (Buhrman et al., 2013; McCracken et al., 2013; Wicksell et al., 2008; 2013). One comparison showed a significant large effect size for life satisfaction favouring ACT (Wicksell et al., 2008). Three comparisons showed significant small to large effect sizes favouring ACT on components of psychological flexibility (Buhrman et al., 2013; Wicksell et al., 2008; 2013). In one study, the effect did not appear immediately after treatment, but at follow-up (McCracken et al., 2013). In a systematic review of ACT and mindfulness-based intervention for chronic pain management (Veehof et al., 2016), it was reported that ACT interventions showed a statistically significant higher mean effect on depression (SMD .82 vs. .18) and anxiety (SMD .64 vs. -.01) than mindfulness-based interventions. In addition to evidence from RCTs, there also are results from partially controlled trials (e.g. Johnston, Foster, Shennan, Starkey, & Johnson, 2010; McCracken, Vowles, & Eccleston, 2005; Vowles, Wetherell, & Sorrell, 2009), and effectiveness studies (e.g., Vowles & McCracken, 2008; McCracken & Gutiérrez-Martínez, 2011), with large average effect sizes across outcomes ($d = .85$ to $.89$), as well as follow-up data, including three years post treatment (Vowles, McCracken, & O'Brien, 2011), showing a medium average effect size ($d=.57$) (Also see review, McCracken & Vowles, 2014).

2.5 Summary

This chapter briefly reviews evolving psychological treatment models and the treatments for chronic pain that emerge from them. The operant approach, viewing pain in behavioural terms, represented a radical shift in perspective from the traditional biomedical model of chronic pain. This development initiated the treatment of chronic pain as a complex experience rather than a purely physical problem, and informed all subsequent developments of psychological approaches to chronic pain management. Cognitive processes did not feature significantly in these early approaches, however, that was to change. Clearly cognitive responses have an important role in the experience and management of chronic pain, and these have practically dominated clinical and research interest in subsequent decades. Over the past three decades, cognitive behavioural approaches have taken over the mainstream of treatment development with a focus on thoughts and beliefs, attention, and coping.

The forty year history of developing pain treatments has undoubtedly produced significant results. And at the same time these can improve. One way to do so may include a deeper, more explicit focus on philosophy, basic principles, and therapeutic process (McCracken & Vowles, 2014) as is the focus in ACT or CCBT broadly as examples of a functional contextual approach.

Chapter 3 Psychological Approaches to the Self

3.1 Introduction

As discussed in previous chapters, chronic pain is associated with significant individual suffering. Not only is chronic pain experienced as a threat to one's physical integrity and cause of disability, it is also experienced as a threat to self and identity, a threat to who one is and perhaps who one may become in the future (Crombez et al., 2003). Facing these threats can create struggles in chronic pain sufferers who attempt to defend or hold on to the "real me" (Toye et al., 2013). Indeed self appears fundamental to a person's mental health and functioning (e.g. Caddell & Clare, 2010; Dymond & Barnes, 1997; Moe & Docherty, 2014). Therefore, the understanding of self in the broad context of psychology can clearly be beneficial to address the struggle with self in chronic pain sufferers. The self is a widely investigated concept in psychology, practically since the beginning of modern psychology (James, 1890). At the same time conceptualizations of the self in available research have varied widely (e.g. Damon and Hart, 1988; Lattal, 1975; Rogers et al., 1977; Vogeley et al., 2001). In this chapter and the following chapter, developments in psychological approaches to the self will be discussed, with the following chapter particularly focusing on a relatively recent development in these approaches. The aim of these two chapters is to provide a brief overview of these approaches. Relevant research methods and evidence will be discussed where available.

3.2 Early Theories on the Self

3.2.1 William James

William James (1890)'s theory of self represents perhaps the earliest discussion of the self in the history of modern psychology. James conceptualized the self as including "I" (the knowing self) and "Me" (the known self). The latter or "empirical me" comprises (1) the material self, (2) the social self, and (3) the spiritual self. The material self includes all things that one can call as his own, such as his body, clothes, family, and home. The social self is defined as the recognition which one gets from other people. Spiritual self refers to one's state of consciousness. In contrast to the "empirical me" the "I" (the knower) is the self that knows the empirical self (the known), which James also described as "a consciousness of personal sameness". The primary distinctions laid out by James, knower versus known self, is remarkable as appears significantly ahead of its time. The importance of the "knower," for

example, may be the key insight in current conceptualizing of the self and at the same time an insight that is not being fully incorporated into most of current research.

3.2.2 Charles Cooley

Charles Cooley (1902) introduced the concept of looking glass self, according to which, sense of self emerges from society's interpersonal interactions and the perceptions of others. Put simply, one's sense of self emerges from one's beliefs about other people's judgements on how one appears to them. According to this theory, a self-concept or "self-idea" has three principle elements: the imagination of our appearance to other people; the imagination of their judgement of that appearance, and some sort of self-feeling, such as pride or mortification. Hence our self and the sense of "I," in pride or shame, arise from our imagined judgement from other people.

3.2.3 George Herbert Mead

George Herbert Mead (1934) also asserted the emergence of the self from social interaction. However his approach to the self was more radical. He conceptualized the self as essentially a social structure that arises in social experience. According to his theory, the individual's self is constituted not only by an organisation of the attitudes of other individuals towards himself and towards one another, but also an organisation of the social group as a whole to which he belongs.

3.2.4 The Self in Humanistic Psychology

Humanistic psychology places heavy emphasis on the self, particularly on individual subjectivity and free will. In this view, every person has a strong desire to realize his or her full potential, to reach a level of "self-actualization". Abraham Maslow's (1954) hierarchy of needs accentuated the concept of "self-actualization". According to his theory, human needs are ordered, with most fundamental levels of needs at the bottom and the need for self-actualization at the top. Later on, Maslow (1969) suggested a further level of needs, self-transcendence, the achievement of self-actualization through "higher goal outside oneself", in altruism and spirituality. Carl Rogers' (1961) theory of the self also emphasizes self-actualisation, which he theorized as the base of "real self". According to Rogers' "self theory", a person's development is based on interactions with the environment, along with an innate tendency to continually aim to fulfil his or her full potential. The "real self" follows one's own values and needs, and

receives positive regard and self-regard. A sense of congruence between experience within society and this actualizing tendency results in the development of an “ideal self”. On the other hand, incongruence or a gap between “real self” and “ideal self” results in a person that is not ideally functioning, or even malfunctioning.

3.2.5 Summary of Early Approaches

These early philosophical discussions of the self comparatively construed the self as a multi-dimensional, inclusive, and generic concept. Some of the concepts that assign separate dimensions to self, such as James’s distinction of “I” and “me,” fundamentally influenced future research on this topic. A common feature of early theories was to ascribe social influences, or essentially social origins, on our sense of self, which is both interesting and important. Assuming this is valid, it implies that self is not inherent but more acquired, and there would appear to be opportunity for change or flexibility. Nonetheless, empirical examination of these conceptualizations of the self has remained limited. It was not until the investigation in developmental psychology that the self was first conceptualized in more specific terms, allowing aspects or dimensions of self to be operationalized, assessed, and subjected to testing.

3.3 Recent Mainstream Approaches to the Self

3.3.1 The Self in Developmental Psychology

In developmental psychology, the focus of research on self has been largely on the differentiation between self and the environment and the emergence of awareness of self. For instance, according to Piaget (1970), children progressively gain knowledge of the world through coordinating their experiences (such as vision, hearing and taste) with physical interactions with objects (such as touching, sucking, and mobilizing). This is the stage called the “sensorimotor stage”, and it is here that children learn that they are separated from the environment. For example, when a child tries to grasp a toy, he or she learns about the shape, size, and texture of the toy as well as those of his or her own hand, and learns to distinguish his or her bodily self from the environment. By the end of sensorimotor stage, children develop a permanent sense of self and object.

Research on the emergence of self-awareness has also been focused on visual self-recognition in humans as well as non-humans. Gallup (1970) tested the possibility of self-recognition in chimpanzees with what is called the mirror test. It was reported that in front of a full-length mirror, chimpanzees reacted to their own images in the mirror with threatening gestures as if the image is another animals, but eventually they start to use their own reflections for self-directed responding behaviours, such as grooming parts of their body previously not observed without a mirror. Similar tests were also used to investigate self-recognition in human children. It was reported that at 6 to 12 months, children will tend to see their own reflection in the mirror as a "sociable playmate," at 18 months half of children recognized the reflection in the mirror as their own, and at 20 to 24 months 65% do so (Lewis & Brooks-Gunn, 1979).

Self-awareness was also investigated in form of "self-referential emotions." Lewis and colleagues (1989) argued that some emotions, which they called self-referential emotions, involve self-awareness and thinking about oneself in relation to others. The researchers examined self-awareness using the mirror test alongside the test of self-referential emotions in young children. In such a test, children were typically asked to dance in front of adults, and their reactions were recorded. It was mostly the children who recognised themselves in the mirror who were embarrassed when asked to dance. The researchers argued that this reflects underlying self-awareness (Lewis, Sullivan, Stanger and Weiss, 1989).

Another important conceptualization of self in this domain is "self-concept." According to Damon and Hart (1982), there are four major categories or common themes in self-concept throughout childhood, including (1) physical features (2) activities (3) social characteristics and (4) psychological characteristics. All four categories are included in most self-descriptions, with physical features decreasing and psychological characteristics increasing in importance throughout childhood. The researchers also argued that children increasingly think of themselves in relation to other people as they grow up, and their self-concept becomes increasingly defined in social terms. Damon and Hart (1988) interviewed children regarding their self-concept, and assigned their responses to different developmental levels as the theory hypothesized. It was observed that higher developmental level of self-concept was

associated with higher developmental level of social-cognitive concepts such as authority and friendship.

In summary, these researches essentially attempted to discover the emergence of self-awareness, and the results from these investigations appear to describe a picture of normal progression of change in this regard. ". Overall these investigations, similar to the early discussions of the self, appear to suggest a sense of self that is acquired through interaction with the physical and social environment. However the self investigated here did not seem clear, definitive or consistent. For instance, Piaget (1970)'s "permanent sense of self" appears to infer the self as a perspective, alongside a physical dimension of the self, while the investigation of self-concept appears comparable with dimensions of James' conceptualization of "empirical me". Nevertheless the developmental psychological investigations present early attempts to empirically investigate the self.

3.3.2 The Self in Cognitive Psychology and Neuroscience

Much of the past research on self has come from cognitive neuroscientists. With the underlying conception of the human mind as an information processor, a fundamental goal of their research is to characterize the architecture of the mind, that is, to delineate the components of the information-processing system and to describe their functions. Some of this work has focused on concepts of "minimal self" and "narrative self" (Gallagher, 2000). In fact, the "minimal self" and "narrative self" here is a comparable conceptualization of the self to James' distinction of "I" and "empirical me". According to Gallagher (2000), "minimal self" is a self that is devoid of temporal extension, a consciousness of oneself as an immediate subject of experience, un-extended in time. "Narrative self" entails a more or less coherent self (or self-image) that is constituted with a past and a future in the various stories that we and other people tell about ourselves. Numerous studies have attempted to examine these two selves. Some of the research in this area is briefly reviewed in the following paragraphs.

Self-reference effect (SRE) is one of the more often investigated concepts in this area. SRE refers to the beneficial effect of encoding self-relevant information, which is consistent with a functionally distinctive memory system for self-knowledge. Rogers et al. (1977) compared memories of adjectives in different conditions, including a self-condition where participants were asked to judge whether the word

described the participant. It was observed that words regarded as self-descriptive were better recalled than words that are not. This led to the conclusion that the self comprises a superordinate schema and the superior recall of words in self-reference condition was attributed to the access of this self-schema. However, Ferguson, Rile and Carlson (1983) found that simply making an evaluative judgement without self-reference (e.g. Is this word a desirable characteristic?) resulted in memory enhancement to the same extent as self-reference judgement. Results from meta-analyses suggested that the superior processing of self-related information, as observed in the investigations of SRE, was the result of a number of highly confounded factors, such as elaboration and organization of encoded information (Symons & Johnson, 1997), and intimacy of the relationship with the “other” (as opposed to the “self”) (Czienskowski, 1997; Symons & Johnson, 1997; Czienskowski, 1997; also see, Czienskowski & Giljohann, 2002). In other words, SRE as observed in these studies may not provide evidence of a distinctive self-schema.

Self-face recognition is another frequently examined concept. The early studies in this area used split-brain patients to examine hemispheric specialization for self-face recognition. For instance, Sperry and colleagues (1979) projected images through brief lateralized presentation to each hemisphere of split-brain patients, so images projected to one hemisphere can only be processed by that hemisphere. The researchers found that self-recognition could be processed in both hemispheres. In another study using functional magnetic resonance imaging (fMRI) Platek and colleagues (2004) presented participants with their own faces intermixed with famous faces, and asked participants to think about the identity of the persons in the pictures. It was reported that self faces evoked more right frontal activity in the middle, superior, and inferior frontal gyri. While various methods and technologies have been used to measure self-face processing these studies nevertheless have not yielded a clear and consistent pattern of anatomical localization of face recognition.

Research in autobiographical memory represents another approach to understanding the self. Much of this work includes the study of pattern of neural activation associated with autobiographical memory. For example, in one study (Fink et al., 1996), participants were scanned while listening to a narrative of their own memories (autobiographical) versus a narrative of other people’s memories (non-autobiographical). Greater activation was observed in right hemisphere areas in autobiographical

condition. However, the two conditions differed in several ways besides autobiographical memory per se, such as the difference in personal relevance and perspective. In a Positron Emission Tomography (PET) study (Maguire & Mummery, 1999), additional dimensions of memory, including personal - relevance and temporal-specificity, were examined (e.g. "You were Mike's best man at his wedding", personally-relevant, specific time; "Presenter Chris Evans has red hair", not personally-relevant, not specific time). Enhanced activity was observed for retrieval of personally relevant, time-specific memories in left hippocampus, medial prefrontal cortex, and left temporal pole, and bilateral temporoparietal junctions were activated preferentially for personal memories, regardless of time specificity. However, it is not clear how the memories used in the two conditions varied regarding other factors such as familiarity. In summary, similar to the studies of face recognition, the indicated brain regions supposedly involved in autobiographical memory varied across studies, and these results were limited by the confounded nature of the memory materials used.

Sense of agency represents yet another concept applied to the analysis of self. Sense of agency refers to the recognition of being the cause of an action. Ruby and Decety (2001) examined the neural localization of agency using PET. The researchers asked participants to imagine either himself or herself or the experimenter performing an action. When participants imagined actions done by themselves, left inferior parietal lobule, posterior insula, post-central gyrus, and bilateral inferior occipital gyrus were activated, while left posterior cingulate cortex and right precuneus, inferior parietal cortex, and frontopolar gyrus were active when participants imagined actions done by the experimenter.

Another experimental paradigm applied to investigate sense of agency includes manipulating the congruence between participants' intended actions and perceived actions. For instance, Farrer and Firth (2002) asked participants to use a joystick to control the motion of a visually presented cursor (agency condition), or used a disconnected joystick while watching the motion of the cursor controlled by the experimenter (external control condition). Participants' brains were scanned while they performing the tasks. Bilateral insula activity was observed in agency condition, while bilateral parietal activity was observed in external control condition. The findings were consistent with those of Ruby and Decety (2001). Similar experimental design was also adapted with verbal stimuli (e.g. McGuire, Silbersweig, &

Frith, 1996) Overall, these studies seem to consistently suggest anatomical specialty for the experience of sense of agency.

First-person perspective has been related to concepts that appear essential to sense of self such as subjectivity and self-awareness. In one study (Vogeley et al., 2001), participants were asked to read scenarios presented either in first person or in third person. In the first-person condition, participants were presented a scenario and were asked questions about their own actions, beliefs, and perceptions. In the third-person condition, an otherwise similar scenario concerned someone else, and participants were asked questions about the person's actions, beliefs and perceptions. A baseline condition not including either point of view was used to assess baseline activation, which was subtracted from activations in the other two conditions. The two conditions, self and other, shared some common areas of activation in the right prefrontal cortex. In addition, the first-person condition involved distinct areas including the right temporoparietal junction and bilateral anterior cingulate cortex.

First-person perspective has also been investigated through emotional response. For instance, Lane and colleagues (1997) asked participants to view emotional pictures and to focus attention on either the spatial aspect of the pictures or their own emotional responses to the pictures. Significantly greater activation in the anterior cingulate cortex was observed when participants focus their attention on their own emotions compared to spatial information about the pictures. However, it was argued that the self-processing task had an affective component to it while the comparison task did not (Gillihan & Farah, 2005). In a review on first person perspective (Vogeley & Fink, 2003), the authors reviewed evidence from functional imaging, neuropsychology and lesion data, and suggested the basic neural mechanisms involved in first-person perspective, namely medial cortical structures and inferior lateral parietal cortex.

In summary, several, differing, self-related cognitive schemas have been investigated from a cognitive neuroscience perspective. Multiple regions of the brain appear to be involved in self-related processing, and evidence does not consistently support specifically hypothesized, self-related, cognitive schemas. Most of these cognitive and neuroscientific investigations of self appeared as attempts to address the "minimal self", a distinctive self-schema. However, the conceptualizations and methods in these studies

often instead reflected aspects of the “narrative self”. For instance, in the studies of SRE, face-recognition, and autobiographic memory, materials such as trait adjectives, face images, and memories were often used. In contrast, studies on sense of agency and first-person perspective conceptualized self as a sense of “ownership” and “agency” and a “perspective” free of these contents. Intriguingly, in a review of neuroimaging results from the investigation of self (Legrand & Ruby, 2009), the authors argued that much of the neuroscientific work in this area has focused on self-related content or self-relatedness evaluation, which are not truly self-specific. The authors argued that this self-relatedness evaluation involves a wide cerebral network, and further demonstrated that this network was also recruited during resting state, “mind reading,” memory recall and reasoning. They also suggested that the activation of the network could be explained as the involvement of common cognitive processes in these tasks, and that the evaluative processes enabling identification, attribution, and reflection upon a subject are not different for self and others. The authors argued, “Self-specificity characterizes the subjective perspective, which is not intrinsically self-evaluative but rather relates any presented objects to the representing subject.” (LeGrand & Ruby, 2009, p.252). Thus, investigation of self-related content or self-relatedness evaluation (such as SRE, self-face recognition, and autobiographic memory) appeared to produce, once again, inconsistent results, while investigation of the “minimal self” (such as sense of agency and first-person perspective) appeared to produce relatively consistent evidence, in terms of specific mapping of these processes onto locations or networks within the brain.

3.3.3 The Self in Social Constructionism

An alternate perspective from the developmental psychology or cognitive neuroscientific approaches to self is a social constructionist perspective. Social constructionism assumes the fundamental importance of language in the construction and maintenance of the self through social interactions with others (Gergen, 2011). From the constructionist point of view (Coulter, 1989; Harré, 1983), there is the self of personal identity, which is experienced as the continuity of one’s point of view in the world of objects in space and time, and the self is usually coupled with sense of agency. Then there are the selves that are publicly presented in the episodes of interpersonal interaction, along with their coherent clusters of traits. The self as personal identity here is regarded as a mere content-free “psychological space.” While the coherence of our thoughts and feelings may change, we as our “self” are intact for the fact that these are ultimately organised into a coherent whole. Within the constructionist perspective there is a

reflection of the “I” or “knower” from William James and at the same time the kind of social origins that have characterized most of the early theories of self.

3.4 Traditional Behavioural Analytic Approaches to the Self

Besides the mainstream approaches discussed above, the self has also been of longstanding interest within the realm of behavioural analysis. In this domain, the self has been interpreted initially based on the notion of “responding to one’s own responding”. According to Skinner:

There is a difference between behaving and reporting that one is behaving or reporting the causes of one’s behaviours. In arranging conditions under which a person describes the public or private world in which he lives, a community generates that very special form of behaviour called knowing. (1974, p. 34-35)

From Skinner’s perspective (1953), the self is “not an originating agent”, but “a locus, a point at which many genetic and environmental conditions come together in a joint effect”, or “an organized system of responses”, “a device for representing a functionally unified system of response” (p. 285). According to Skinner (1974), a sense of self emerges from learning through verbal interactions to discriminate one’s own responding. The two selves, the knowing self and the known, emerge when the verbal community asks about behaviours thus generating self-descriptive behaviours. Different contingencies of reinforcement create different organised systems of responses. In this way, self-knowledge is of “social origin”. Different communities generate different kinds and amounts of self-knowledge and different ways in which people explain themselves to themselves and others. Skinner’s views of the self implied the importance of personal history of behaviour interactions.

Many studies investigated this behavioural analytic conceptualization of self in nonhuman subjects, and these experiments demonstrated that animals’ responding can come under control of their own previous behaviour (e.g. Lattal, 1975; Pliskoff & Goldiamond, 1966; Reynolds, 1966; Reynolds & Catania, 1962). For instance, Lattal (1975) examined the discriminative properties of two different reinforcement contingencies using pigeons. The researcher trained the birds to peck either the green key or the red

key (uniquely illuminated on each side), depending on if they had pecked earlier the yellow key (uniquely illuminated in the middle) for reinforcement, according to either a differential-reinforcement of-low-rate schedule or a differential-reinforcement-of-other-behaviour schedule. In fact, the pigeons learned to discriminate their own behaviour in the previous task. Similarly, Pliskoff and Goldiamond (1966) had earlier trained pigeons to peck the left or the right, in a conditional discrimination task, depending on if they had pecked a key linked to a smaller fixed ratio or larger fixed ratio in earlier task.

In summary, a traditional behavioural analytic approaches to the self attempt to address a “knowing self” and “the known” in terms of responses. This conceptualization appears capture both “I” and “me”, as William James (1890) suggested. The conceptualizing the self in behavioural terms also implies an emphasis on environmental influence on the emergence of the self, and most importantly allows empirical testing of these concepts.

3.5 The Philosophic Assumptions behind Psychological Approaches to the Self

So far mainstream approaches to the self, as well as a traditional behavioural analytic approach to the self, have been briefly reviewed. These approaches vary in conceptualization, in the predominant methodology for investigating self, and most fundamentally in philosophical assumption or worldview. Philosopher Stephen Pepper (1942) noted that philosophical systems tend to cluster around a few distinct "world hypotheses" or "worldviews." Each worldview is characterized by a distinctive underlying root metaphor and truth criterion. Root metaphors serve as the basic model by which an analyst attempts to understand the world, and are based on common-sense objects or ideas. Truth criteria provide the basis for evaluating the validity of analyses.

Among the four worldviews that Pepper (1942) identified as “relatively adequate”, “mechanism” is the one predominantly adopted in the cognitive neuroscientific domain and in most cognitive behavioural approaches with clinical psychology. The root metaphor of mechanism is the machine, and the truth criterion is the correspondence between one’s theory about the mechanism and empirically measured reality. The goal of the mechanist is to discover the parts and the relations among parts of the existent machine. In respect to psychological approaches to the self, the self has often been conceptualized as

an executive component of the mind, or a key component of the information-processing machine (e.g. Northoff & Bermpohl, 2004). Alternatively, the self has been seen as a product of processing, or an abstract representation of multiple sources of experiential information (e.g. Daniel, 1991). In fact, the implicit assumption of uncovering truth in mechanism is shared by another major worldview in psychology – “organicism.” The root metaphor of organicism is the process of organic development, as in living, growing, organic system. The truth criterion of organicism is coherence. It is assumed that the objects of study invariably develop according to certain identifiable stages in an overarching pattern. With regard to the self, humanistic theories and developmental theories, for instance, are examples of organicism view of the self.

Distinct from the two worldviews discussed is the worldview of “contextualism.” The root metaphor of contextualism is the on-going act in context. In this view, on-going act is understandable best within their current and historical context. The truth in “contextualism” does not depend on uncovering the nature of reality. The truth criterion of contextualism lies in “successful working”, in that if a hypothesis or principle leads to effective action or achievement of goals, it is regarded as “true” (Pepper, 1942). In psychology there are two main forms of contextualism: descriptive contextualism and functional contextualism. The goal of descriptive contextualism is a personal understanding of psychological events. The early theories on the self, including the theories of James, Mead and Cooley, as well as social constructionism are examples of descriptive contextualism (Hayes, 1993). On the other hand, the goal of functional contextualism is prediction and influence of behaviour, and explicitly stated goals determine the pragmatic nature of this view. Behaviour analysis and the behavioural approach to the self, for example, are grounded in this philosophical assumption. A behavioural approach to the self, and its underlying philosophical assumptions, based in Functional Contextualism, will be further discussed in next chapter.

3.6 Summary

In summary, various approaches have been applied to the investigation of the self within psychology. Early approaches, including the theories from James, Cooley, and Mead, as well as the discussion within humanistic psychology, conceptualized the self in a comprehensive and generic fashion. The influence of

these historical approaches within more contemporary approaches is clear, however, empirical evidence from these approaches was limited.

Relatively recent approaches to the self, a developmental psychological approach and a cognitive neuroscientific approach in particular, conceptualized the self in terms of more specific parts or functions, or patterns of specific self-related responding, and produced a large volume of empirical research. This effort of “discovering” the self certainly significantly has increased the number and variety of our variables of interest and revealed the potential complexities possible in conceptualizing the “self.” Indeed these approaches to the self varied in their variables of interest and in methods of investigation. At the same time results, particularly within cognitive neuroscience approaches were not always consistent, which means the accumulated empirical evidence is not currently as useful as it could be. This in turn means we are limited in the clinical applications we can design and test.

Within a functional contextual philosophical framework, researchers attempt to investigate the self as “act in context”. Early approach in this domain conceptualized self-awareness as “responding to one’s own responding”. Indeed, empirical investigations in animals appeared to demonstrate discrimination of one’s own responding. However, it has been argued that self-awareness in human is an extremely complex behaviour pattern, rather than the limited form of self-awareness observed with non-humans (Barnes-Holmes, Stewart, Dymond, & Roche, 2000). In this regard, a contemporary contextual behavioural approach to the self will require new concepts and tools, and probably different methods, than those used in earlier generations of behaviour analysis. A contextual behavioural approach to the self is discussed in detail in chapter 4.

Chapter 4 A Contemporary Contextual Behavioural Approach to the Self

4.1 Introduction

A recent development in research into the self is a contextual behavioural approach. This contextual behavioural approach to the self, rooted in the philosophical assumptions of functional contextualism, is linked to basic research of human language and cognition, Relational Frame Theory (RFT; Hayes, Barnes-Holmes, & Roche, 2001), and a generic model of human functioning and wellbeing, Psychological Flexibility (PF; Hayes, Strosahl, & Wilson, 2012). This chapter will set out with a brief description of functional contextualism, followed by discussion of RFT and an RFT account of the self, and finally a three-dimensional conceptualization of the self that has emerged as a part of the PF model, will be discussed.

4.2 Functional Contextualism

Contextual Behavioural Science (CBS) is a broad approach to psychological research grounded in functional contextualism (Hayes, Barnes-Holmes, & Wilson, 2012). Functional contextualism (Pepper, 1942) is a specific variety of scientific contextualism (Hayes, Hayes, Reese, & Sabin, 1993). The core unit of analysis of functional contextualism is act-in-context. Functional contextualism focuses on the behaviour of organisms interacting in and with a historical and situational context. These units are holistic in that the act and its context are not fully separable. All actions are considered to be whole events, having meaning only with reference to their context. History, circumstance, and consequences are aspects of the act itself in a functional sense. For example, a person walking into a shop to buy groceries is engaged in a fundamentally different act than a person walking into a shop where he or she works, even if the movement of walking into a shop is the same. The truth criterion here is “successful working” towards one’s goals. In other words, if a hypothesis or principle leads to effective action or achievement of goals, it is regarded as “true”. The goal of functional contextualism is to predict-and-influence, with precision, scope, and depth (Hayes, 1993). This goal is what is most distinctive about functional contextualism as compared to other forms of contextualism, such as descriptive contextualism. It also determines the pragmatic nature of functional contextual approach. From a functional behavioural perspective, to influence requires the specification of manipulatable events, and only contextual variables can be manipulated directly (Biglan & Hayes, 1996). Therefore, thoughts may

be related to particular emotions and overt behaviours, but only in historical and situational contexts that give rise to these thoughts and their relation to subsequent emotions and actions (Hayes, Levin, Plumb-Villardaga, Villatte, & Pistorello, 2013).

4.3 A Contextual Behavioural Approach to the Self

4.3.1 Relational Frame Theory

Relational frame theory (RFT) is a functional analytic account of the development of human language and cognition. "RFT treats relational responding (e.g. responding to stimulus B in terms of A) as a generalized operant, emerging from a history of "multiple-exemplar training" (Hayes, Barnes-Holmes, & Roche, 2001, p. 141). The relation of coordination is an example of such relational responding (e.g. actual snake = word "snake"). Specific types of relational responding, termed relation frames, are defined in terms of the three properties: (1) mutual entailment, (2) combinatorial entailment, and (3) transformation of functions. Mutual entailment refers to the bi-directionality of relational responding; for example, if A is bigger than B, then B is smaller than A. Combinatorial entailment refers to generating relations based on the combination of known relations; for example, if A is bigger than B, and B is bigger than C, then A is bigger than C. Transformation of stimulus functions refers to the context-specific transformation of psychologically-related functions in accordance with the underlying relation; for example, if A=B, and A is dangerous, then B is dangerous. According to RFT, Through multiple-exemplar training in socio-verbal environment (e.g., Father points to a snake in the zoo, telling the child "this is a snake"), the patterns of relational frames become increasingly complex in terms of more extensive examples of the frame of coordination, and additional frames including distinction (different from), opposition (opposite to), comparison (e.g. bigger than) and others. According to RFT, relational responding is arbitrarily applicable. That is, learned relational responding can come under the control of arbitrary contextual cues, not solely the formal properties of related events nor direct experience with them.

Derived relational responding (i.e. generating derived untrained behaviour) is a basic concept underlying RFT. Derived relational responding is normally studied using a match-to-sample format. In a standard equivalence training procedure, participants will be presented with each of the three sample stimuli, along with each of the three comparison stimuli (A1-B1-C1, A2-B2-C2, and A3-B3-C3). Choosing

comparison stimuli in the presence of sample stimuli will be reinforced (Choosing B1, B2, and B3 in the presence of A1, A2, and A3 respectively, and choosing C1, C2, and C3 in the presence of B1, B2, and B3 respectively). It is assumed that participants will spontaneously reverse the trained relations (derived symmetrical stimulus relations), and often respond in accordance with derived transitive stimulus relations without further training (matching A1-A2-A3 to C1-C2-C3). When both symmetry and transitivity emerge, the stimuli involved are assumed to participate in an equivalence relation (e.g. Sidman, 1990). Once relations between stimuli are established in patterns of behaviour, functions or influences can be added (directly trained) to selected stimuli and it is these that then give rise to derived relational responding (not directly trained).

4.3.2 Verbal Self-discrimination and self-awareness

Relational frame theorists argued that self-awareness in humans is an extremely complex behaviour, rather than the limited form of self-awareness observed with non-humans, due to the complexity of human language (Barnes-Holmes, Stewart, Dymond, & Roche, 2000). To address this complexity, RFT researchers examined the transformation of self-discrimination response functions with equivalence and other derived relations (e.g. Dymond & Barnes, 1994, 1995; Dymond & Barnes, 1996). These studies combined the paradigm used in early behavioural analytic non-human studies on self-awareness (e.g. Lattal, 1975) with methods used in study of derived stimulus relations. For instance, the first of these studies tested the transformation of self-discrimination response functions through equivalence relations (Dymond & Barnes, 1994). Subjects were trained for the formation of three equivalence classes in six symbolic match-to-sample tasks (See A1, choose B1; A1-C1, A2-B2, A2-C2, A3-B3, A3-C3). B1 and B2 were then used to train two different self-discrimination responses on two schedules of reinforcement (i.e. If subjects had not emitted a response, the choice of B1 was reinforced, and if subjects had emitted one or more responses on the previous schedule, the choice of B2 was reinforced.). Following the training, subjects were tested for and demonstrated each potential transfer of self-discrimination response functions through equivalent relations (i.e. no response on the schedule, choose C1; one or more responses, choose C2), as hypothesized. In a control condition where two subjects were not exposed to any match-to-sample tasks, and two participants were trained in match-to-sample tasks using N1 and N2 and tested using C1 and C2 in the transfer test, all four subjects failed to demonstrate self-discrimination transfer.

According to RFT theorists, human self-discrimination often involves arbitrarily applicable relational responding, and a verbally-able human not only behaves regarding his or her own behaviour, but also behaves verbally regarding his or her own behaviours (Hayes & Wilson, 1993). While a non-human's self-discrimination is simply a discrimination in which the original response (e.g. pecking according to different schedules, see Lattal, 1975) becomes discriminative for the second (choosing the green or red key), the responding of a language-able human is often controlled by the participation of verbal events in derived stimulus relations and the functions that may transform in accordance with those relations (Barnes-Holmes et al., 2000).

4.3.3 Perspective-taking

From a RFT perspective, the self has also been addressed through what is called "deictic" relational framing, which includes perspective -taking. Deictic relational frames indicate a relation in terms of perspective of the speaker (McHugh, Barnes-Holmes, & Barnes-Holmes, 2004). The most basic frames in this regard include I versus You, Here Versus There, and Now versus Then. In these frames, it is the relationship between the individual and other events that serves as the constant variable upon which these frames are based. According to RFT, the relational properties of these frames are abstracted through learning to talk about one's own perspective in relation to those of other's, and are established through, similar to relational framing in general, numerous exemplars of perspective -taking, by answering questions such as "what are you doing here now" and "what was I doing there then" and so forth. In ordinary verbal interactions, these phrases (I-You, Here-There, Now-Then) often appear as other words in coordination with specific individuals, places and times. For example, "I am at a party (Here and Now), and Michael is still at work (There and Now)."

There has been accumulating empirical studies in support of this account of perspective taking. McHugh and colleagues (McHugh, Barnes-Holmes, and Barnes-Holmes, 2004) developed a protocol to examine these three frames (I-You, Here-There, Now-Then) in accordance with three levels of relational complexity, including simple relations, reversed relations, and double reversed relations. To illustrate, in a simple I-You task, participants were asked: "If I (experimenter) have a pen and YOU (participant) have a cup, what do I have? What do YOU have?" To answer this question correctly requires participants to

respond in accordance with the I-You deictic relational frame. In a reversed I-YOU task, participants were asked: “If I have a pen and you have a cup, and if I was you, and you were me, what would I have? What would you have?” To correctly answer this question requires a transformation of function in accordance with the I-You deictic relation frame (i.e. The mutually entailed relation between I and You transfers “pen” from I to You and “cup” You to I.). In a double reversed relations (two relations simultaneously reversed) task (e.g. I-You and Here-There), participants were asked: “I am standing here at the yellow door, and you are standing there at the brown door. If I was you and you were me, and if here was there and there was here, where would you be standing? Where would I be standing? The reversals involve two mutually entailed relations (I-You and Here-There). This study found differences in participants’ responses on different frames and different relational complexities. Participants emitted fewer errors on I-You frame compared to Here-There and Now-Then frames, and more errors in reversed and double reversed relation tasks.

4.3.4 The Three Selves

From an ACT perspective, self was initially conceptualized as the including three senses of selves: self-as-content, self-as-process, and self-as-context (Foody, Barnes-Holmes, & Barnes-Holmes, 2012; Hayes, 1995; McHugh, 2015). Within this view, available senses of selves are by-products of human verbal behaviours. For example, through training with numerous exemplars of perspective taking, a sense of self-as-context, or a coherent perspective “I” regardless of the changing physical and social environment emerges. From a RFT perspective (Foody, Barnes-Holmes, & Barnes-Holmes, 2012), there are two constant aspects of the self in this regard – your perspective that is always located HERE-NOW and your psychological content that can be located HERE-NOW (self-as-content and self-as-process) or THERE-THEN (self-as-context). Figure 1 illustrates the conceptualization of the three selves in RFT. Thus there is no change in perspective, but changes in the locations of content. Specifically, you can readily switch between self-as-content and self-as-process, as the content of both senses is located HERE-NOW, but the switch between self-as-process and self-as-context involves switch of content from HERE-NOW to THERE-THEN. You cannot switch between self-as-content and self-as-context, as you have to engage in self-as-process.

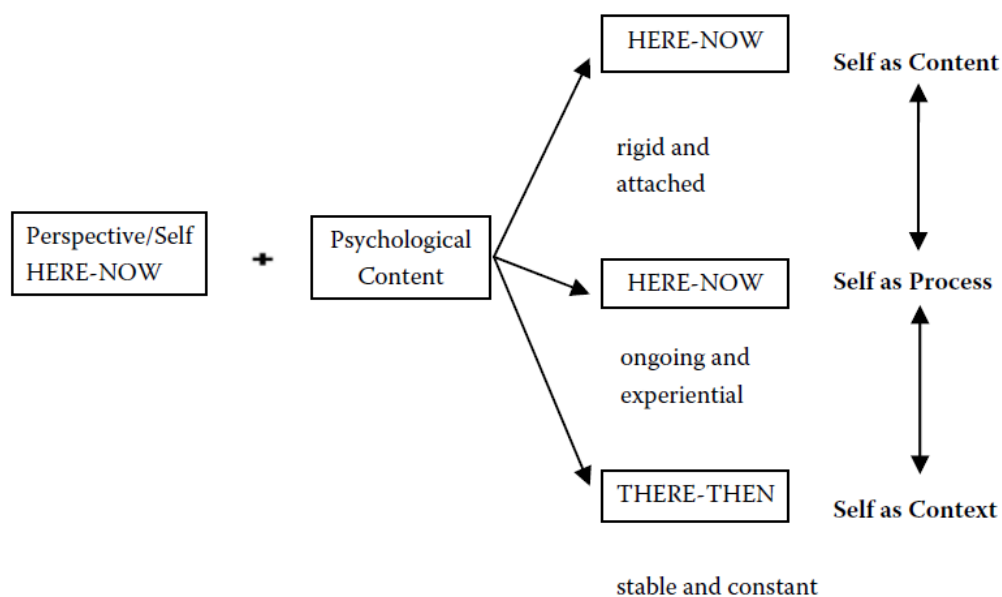


Figure 1. Conceptualization of the three selves as perspective-taking relations (Foody, Barnes-Holmes, & Barnes-Holmes, 2012)

Basically, self-as-content involves describing and evaluating oneself. In this conceptualized self, one identifies oneself with his or her psychological content. Put simply, “I am who I think I am”. Self-as-process involves a process of on-going awareness, or the ability to be aware of ongoing events. Self-as-context, or self-as-observer, involves distancing from one’s psychological content. It is a “perspective” that one can take, to connect with oneself as an observer of the content of one’s psychological experiences.

There is nothing inherently wrong with describing or evaluating yourself. It only becomes problematic when one becomes attached to and identified with the description and evaluation in ways that reduce effective functioning. Attached content automatically becomes part of the conceptualized self. In RFT terms, in self as content, your psychological content is coordinated (same as) with the self, as both are located HERE-NOW. When this coordination is not fluid, on-going, and experiential, the content becomes rigid, or dominates experience. These available functions of the content transfer to the coordinated self, and this is what is meant by “attached.” Consequently, the psychological content, or the conceptualized self is likely to exert control over your overt behaviours, and restrict your behaviour choices. Although in self-as-process as in self-as-content, your psychological content is located HERE-NOW, the former lacks fusion between the self and psychological content. The fluid nature of self-as-

process allows behavioural flexibility, in that the on-going changing experience provides a broad range of behavioural options. When operating in self-as-context, unlike self-as-content and self-as-process, your psychological content is located THERE-THEN, and you are detached from your perceptions of your content (description, evaluation, etc.). Our learning histories, however, are full of discriminating and evaluating of our behaviours, thus we need special training to keep operating in self-as-process, and to transform the coordination relations between psychological content and self to a relation of distinction and hierarchy where self is located HERE-NOW, while psychological content is THERE-THEN (self-as-context).

There has been emerging empirical research supporting this conceptualization of the self. In one study, Foody, Barnes-Holmes, Barnes-Holmes, & Luciano (2013) investigated the relative utility of manipulating distinction deictic versus hierarchical deictic relations in a self-as-context exercise designed to reduce experimentally induced emotional distress in naïve students. A self-criticism (negative self-referential thought) task was applied to induce distress (measured as stress, discomfort and anxiety). In the distinction self as context condition, participants received an intervention where the deictic relations of I-YOU and HERE-THERE were explicitly enhanced to facilitate the distinction between self and content. In the hierarchical self as context condition, participants received an intervention in which participants were instructed to see themselves as above their psychological content (hierarchical relations). The finding showed superiority of hierarchical self as context intervention over distinction self as context intervention in terms of reducing distress.

In fact, before the investigation of Foody and colleagues (2013), researchers have examined the distinctive and hierarchical relations between the self and the content (Luciano et al., 2011). In one study, Luciano and colleagues (2011) attempted to facilitate defusion with adolescents at high or low risk of conduct difficulties. In one condition, the researchers attempted to facilitate a separation between the self and the content, while in the other condition, a hierarchical relation between the self and the content was also included. It was observed that participants who received the training including hierarchical relations improved in a range of clinical outcomes.

One study investigated self-discrimination behaviours in relation to long-term wellbeing (Atkins & Styles, 2016). The researchers coded interviews for occurrence of self-discrimination behaviours including self-as-story (positive, negative), values-oriented self-rules, control-oriented self-rules, and self-as-context. The frequencies of these self-discrimination behaviours were then used to predict wellbeing (measured as affect and meaning and satisfaction in life) six months and twelve months later. Two self-discrimination behaviours including those reflecting values-oriented self-rules and self-as-context, predicted wellbeing six months and twelve months later.

Another study investigated associations among several ACT-consistent factors and how they relate to evaluations of positive and negative self-relevant thoughts (Duff, Larsson, & McHugh, 2016). It was observed that ACT-consistent variables were associated with thought relations (i.e., believability of the thought, discomfort with having the thought, and willingness to engage with the thought) rather than evaluations of content (i.e., negativity of the thought). It was also identified that mindfulness, experiential avoidance and cognitive fusion predicted psychological distress, in which believability of negative thoughts played a partially mediating role.

4.4 Summary

In summary, in the functional behavioural domain, the self has been investigated through verbal self-discrimination behaviour, and perspective taking. A three-dimension conceptualisation of the self, based in PF, ACT and RFT, has also been suggested. Empirical evidence in support of these hypotheses is emerging. Indeed, this three-dimension model of the self includes what are called “middle-level terms” (self-as-content, self-as-process, and self-as-context). These are practical terms that help to make precise technical processes more usable but are not themselves precise technical terms. For this reason, among others, empirical investigation of this model can be challenging. Despite the terms for self within PF being available for study for since sometime around 1999 or perhaps shortly before (Hayes, et al., 1999) there has been extremely limited research, particularly applied clinical research, into self from the functional contextual approach that includes PF, ACT, and RFT.

The model of self that emerges from a RFT perspective, has begun to bridge the gap between the self-related middle-level terms and more functionally sound and empirically tested concepts, including deictic relational frame (Foody, Barnes-Holmes, & Barnes-Holmes, 2012). Yet more empirical investigation of this model of the self is certainly in need. Basic behavioural principles are often too technical and abstract to apply or translate directly into clinical work. These mid-level terms, on the other hand, can be readily adopted for clinical guidance (Hayes, Levin, Plumb-Villardaga, Villatte, & Pistorello, 2013), and can of course be used to instigate clinic-based research.

In fact, PF and ACT place significant emphasis on self-based processes techniques since the early inception for related concepts (Hayes, 1995) to the present day. However, as already noted, investigation of the self-related processes within the PF model remains limited. This three-dimension model of self, based in PF and ACT, may potentially appears useful for facilitating organized research of these self-related processes within the PF model, which in turn can inform treatment development.

As discussed in the previous chapters and the current chapter, chronic pain is associated with significant suffering including the struggle over one's self, which in turn can create detrimental impact on functioning and wellbeing in people with chronic pain. The importance of self is clearly evidenced by the large volume of research on this topic. However, psychological investigations into the self have been vastly varying. This can also be the case in chronic pain. To comprehensively review these investigations, and to synthesize the evidence if possible, can perhaps clarify the overall picture of this effort, and allow an assessment of the evidence on the role of the self in chronic pain. This in turn can inform future research on this topic and clinical application. Furthermore, as discussed in the current chapter, a contextual behavioural model of the self, with its link to basic research of human language and cognition (RFT) and a generic model of human functioning and wellbeing (the PF model) can potentially facilitate and organize research and clinical application. Such a comprehensive review could provide an insight into the feasibility of applying the three-dimensional model of the self as discussed above. However, as noted, research in the functional contextual model of self has been limited. This is largely due to the lack of adequate measurement. The availability of a measure of self based on this model could also advance research and treatment development in this area.

The aim of this PhD project is to investigate the role of self in functioning and wellbeing among people with chronic pain. This in turn comprises three specific objectives: (1) to systematically review studies of the role of self in functioning in people with chronic pain, and to examine the feasibility of applying the functional contextual model of self to the investigation of self in chronic pain; (2) to develop a measure of self based on the functional contextual model of self (self-as-context) in a chronic pain sample, so that such a measure is available for further research, particular in clinical settings; and (3) to investigate the role of self-as-context in treatment for people with chronic pain. Four empirical studies addressing these objectives are discussed in the following four chapters respectively. In chapter 5, a systematic review of conceptualization, assessment methods, and evidence for self and identity in chronic pain is presented within the framework of the functional contextual model of self. In chapter 6, the development of a measure of self (self-as-context), based on the functional contextual model of self in a chronic pain sample is described. In chapter 7, the investigation of the relations between changes in self-as-context and changes in functioning in the context of a single-group ACT-oriented treatment for chronic pain is described. In chapter 8, an online experiment designed to investigate the causal relations between self-as-context and outcomes is described.

Chapter 5 A Systematic Review of the Investigation of the Self in Chronic Pain

5.1 Chapter Overview

As discussed in previous chapters, the self appears to be fundamental to human functioning and wellbeing (e.g. Caddell & Clare, 2010; Dymond & Barnes, 1997; Moe & Docherty, 2014). This indeed appears to be the case in people with chronic pain (e.g. Crombez et al., 2003; Toye et al., 2013). A large body of research has been done to investigate the role of self functioning and wellbeing in people with chronic pain. Consistent with the picture of general psychological investigation of the self, various approaches have been adopted to investigate the self, including varied conceptualizations of the self and methods applied. To comprehensively review these investigations, and to synthesize the evidence if possible, could provide an overview of this effort, and a deeper understanding of the role of the self in chronic pain. This in turn could inform treatment development.

This chapter investigates the role of the self in chronic pain. To do so, a systematic review was conducted to examine the conceptualization, methods, and evidence from empirical studies of the self in relation to functioning and wellbeing in people with chronic pain.

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5.2 Published Article

Manuscript Number: JCBS-D-15-00049R1

Title: In search of the person in pain: A systematic review of conceptualization, assessment methods, and evidence for self and identity in chronic pain

Article Type: Review Article

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Authors: Lin Yu, MRes; Sam Norton, PhD; Anthony Harrison, MSc; Lance M McCracken, PhD

Abstract: One way to develop psychological approaches to chronic pain is to improve our understanding of psychological processes that both underlie the impacts of pain and can be addressed in treatment. A set of processes that deserves further attention in this regard is those related to self or personal identity. The aim of this systematic review was to examine the conceptualizations of processes related to the self in studies of people with chronic pain, approaches to assess these processes, and the evidence for their role in relation to key measures of daily functioning. Fifteen distinct self-related processes were identified from 54 studies. These processes include three categories: a sense of self that is based on self-evaluation, a sense of self that is based on attributes or self-description, and a sense of self that is detached from these. Different methods, including questionnaires, interviews and experimental approaches were adopted to assess these self-related processes. Relations between self-related processes with daily functioning were examined. The evidence suggests that negative evaluations of the self are particularly associated with problems in daily functioning in people with chronic pain while a sense of self that is distinct from these evaluations is associated with benefit in this functioning. Overall a lack of order or theoretical clarity in the studies included is also identified from the review. It appears, however, that greater order can be achieved by applying the distinction between the conceptualized versus the con-textual self from the Psychological Flexibility model.

Keywords: Chronic pain; Self; Identity; Cognitive Behavioral Therapy; Psychological Flexibility

Introduction

Chronic pain represents a major public health problem with clear and significant economic and social impacts (Breivik, Collett, Ventafridda, Cohen, & Gallacher, 2006). Pain can dramatically diminish daily functioning and quality of life for chronic pain sufferers, decrease their work productivity, and escalate health care costs (Reid et al., 2011). Psychological approaches have been widely applied in chronic pain management, and appear beneficial (Jensen & Turk, 2014). However, the average effects of psychological treatments for chronic pain are small and further development is needed (Williams, Eccleston, & Morley, 2012). It is often proposed that one way to improve these treatments is to focus on improving our understanding of potential treatment mechanisms or processes (Morley & Keefe, 2007; Thorn & Burns, 2011). This understanding could then feed the development of treatment methods so that they more precisely target and significantly impact on these (McCracken & Marin, 2014; McCracken & Morley, 2014). One set of processes that deserves further attention in this regard is those related to self or personal identity.

It would seem that there is nothing so central to a person's well-being as their sense of who they are, their identity, or self (Rogers, 1961). And yet it appears that chronic pain can negatively impact on self or create struggles to defend or to hold onto the “real me” when faced with threats (Toye et al., 2013). The changes to one's life and apparent assaults on physical and psychological integrity associated with chronic pain are certainly experienced as impacting on who a person is, and perhaps who they may be in the future (Crombez et al., 2003).

There has been accumulating evidence for the role of self-related processes in chronic pain. Researchers have previously theorized about specific cognitive processes relevant to the impact of pain on the “self” (Pincus & Morley, 2001), and there are now numerous studies of sense of self in relation to daily functioning for people with chronic pain (Compañ et al., 2011; Harris, Morley, & Barton, 2003; Morley, Davies, & Barton, 2005; Pincus, Pearce, McClelland, & Turner-Stokes, 1993; Tang, Goodchild, Hester, & Salkovskis, 2010). There are also current treatment developments, particularly those based on mindfulness (Carmody, Baer, Lykins, & Olendzki, 2009), self-compassion (Gilbert & Procter, 2006; Neff, 2004), and the psychological flexibility model (Hayes, Strosahl, & Wilson, 1999; McCracken & Morley,

2014), that include self-related processes as a core therapeutic focus. These developments may represent an important opportunity.

Unfortunately the literature on self, including the literature on self and chronic pain, is not currently well organized. Part of the difficulty is that terms like “self” and “identify” can be ambiguous terms, having both everyday definitions and potentially more technical ones. In a comprehensive search it was found that there are 66 self-related variables identifiable in the psychological literature (Leary & Tangney, 2003). This large number holds the potential to cause confusion. It would be better if the research focusing on self-related processes, including research into chronic pain, were organized, perhaps around a smaller number of core processes within a broader framework. There are published re-views that summarize what is known about the role of self in different conditions in general (Gillihan & Farah, 2005; Prebble, Addis, & Tippet, 2013), or in the context of dementia for example (Caddell & Clare, 2010), but none of these have focused on chronic pain.

A recently discussed three-dimensional conceptualization of the self holds the potential to organize approaches to self in research and treatment development (McHugh and Stewart, 2012; Foody, Barnes-Holmes, & Barnes-Holmes, 2012). This conceptualization of the self is rooted in a broader contextual cognitive behavioral or functional contextual model of human functioning (Hayes et al., 1999), now referred to as the Psychological Flexibility (PF) Model (Hayes, Luoma, Bond, Masuda, & Lillis, 2006). This model includes content, process, and context elements as the key defining features giving rise to a verbally conceptualized self or self as content, processes of ongoing awareness, and self that is detached or separate from content, also referred to as ‘self-as-context’. This model of self is associated with Acceptance and Commitment Therapy (ACT; Hayes, Strosahl, & Wilson, 2012). The application of this model could serve as an organizing framework to summarize approaches to self in relation to chronic pain, and progress treatment development, through more precise understanding and more focused targeting at self-related processes. However, it is not known how well the literature on self and chronic pain reflects the three-dimensional conceptualization associated with this model.

The purpose of this study was to systematically review the literature on self and directly related processes in relation to chronic pain and to preliminarily examine the applicability of a functional

contextual model of the self in chronic pain research as a potential organizing scheme. In turn, this review has three specific aims: (a) to investigate conceptualizations of processes related to self in studies of people with chronic pain and to organize these into a summary set of core processes, (b) to examine and evaluate approaches to assessment of self-related psychological processes in these studies, and (c) to summarize, if possible, evidence for the role of self in relation to key measures of daily functioning in people with chronic pain, particularly emotional and physical functioning.

Methods

Study inclusion

Studies were included in the present review if they:

- Were available as a full publication or report (abstract and full text retrievable).
- Were published (or electronically pre-published) in a peer-reviewed journal.
- Were published in English.
- Investigated at least one psychological construct or process related to self.
- Utilized a measure or manipulation of a process related to self.
- Focused on participants reporting or diagnosed with chronic pain.
- Included adults participants (typically 18 years and older).

Studies were excluded if they:

- Exclusively used qualitative methods.
- Were only review article.
- Included participants with only headache or migraine.
- Primarily included participants diagnosed with cancer or similar life threatening conditions.

Search methods

Empirical studies investigating self and identity in adult chronic pain populations were identified by searching MEDLINE, EMBASE and PsycINFO from their inception to September 2014. Search terms for self-related psychological constructs were selected from a recent review and summary generated by an in-depth process of searching and collecting “self” terms in PsycINFO. In addition, all the “self” terms

included were explored in the thesaurus system of the three databases searched by exploding subject headings to detect possible terms of interests.

The following “self” terms were included in the search strategy: identity, self-identification, ego, self-compassion, self-evaluation, self-esteem, enmeshment of self, ought self, should self, possible selves, self as perspective, self as context, self-awareness, self-concept, self-consciousness, self-discrepancy, self-image, self-perception, self-presentation, self-reference, self-schema, sense of self, self as agent, self as observer, narrative self, the knowing self. The search strategy was designed to ensure these terms and their variants were comprehensively searched.

The search strategy for “chronic pain” was adapted from that of a Cochrane review of psychological treatments for chronic pain (Williams et al., 2012). A complete description of the database search strategy is included in Appendix A. In addition to the database searches, reference sections of identified studies were examined for potentially eligible studies.

Selection of studies

The initial electronic search yielded 2101 titles after de-duplication. The lead author examined all titles and abstracts that emerged from the databases. Through this process 2001 studies were eliminated. 20 full texts were not retrievable. Full-length articles were obtained for 80 studies that potentially met the study criteria. Two authors examined the 80 full-length articles. A consensus agreement on inclusion or exclusion was obtained. From this process, 50 studies were identified as meeting criteria for this review. Through hand searches of these articles an additional four studies were identified. Two authors examined these four full-length articles. A consensus agreement on inclusion or exclusion was again obtained. Finally, 54 studies were identified as meeting criteria for this review. A flow diagram depicting this selection process is included in Figure 1.

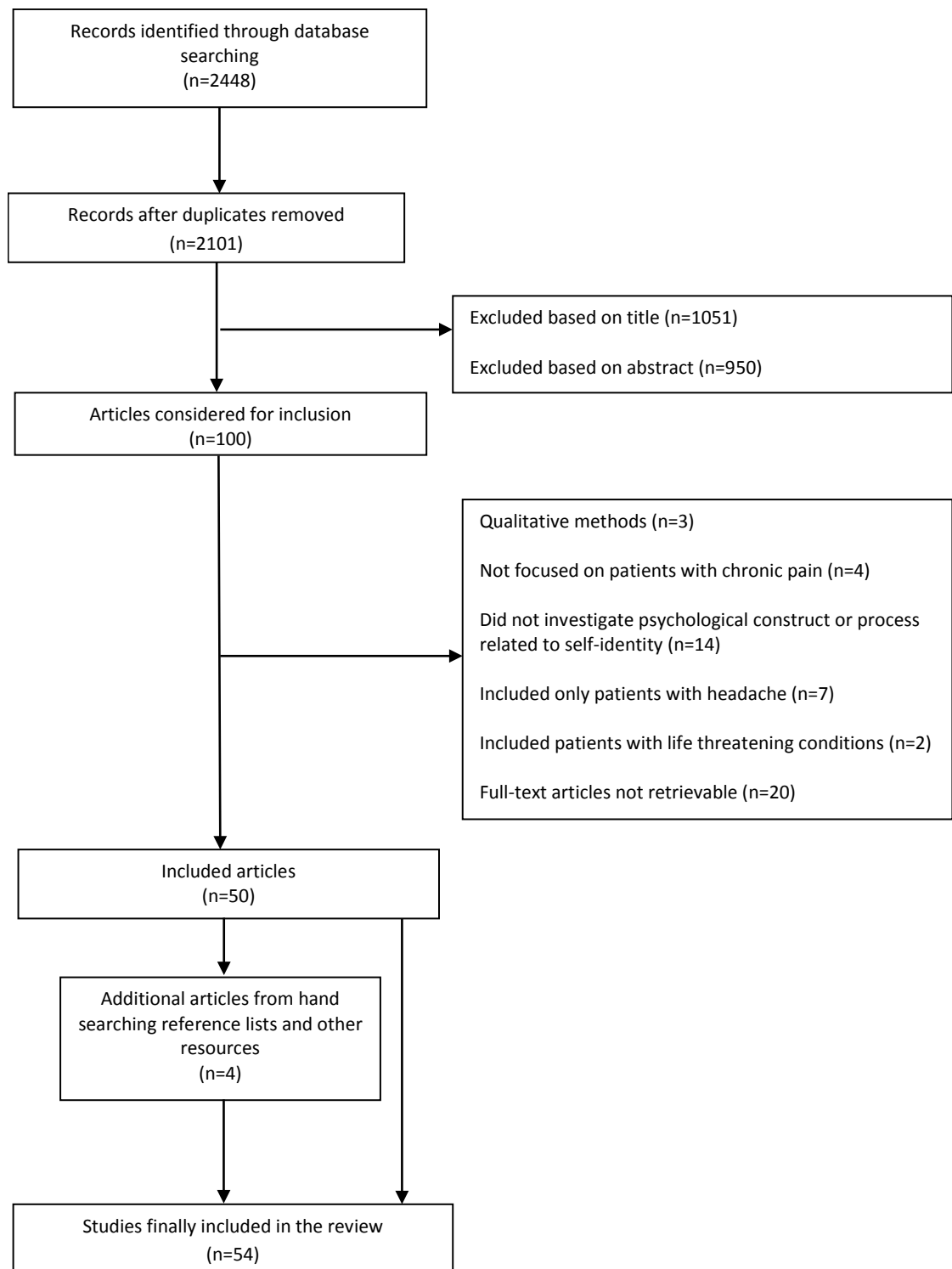


Figure 1. PRISMA flow diagram

Data extraction

A data extraction tool was devised for this study based on Guidance on the Conduct of Narrative Synthesis in Systematic Reviews (Popay et al., 2006). Extracted data included details relating to authors, date of publication, participants, study design, conceptualization of the self-related psychological constructs, measure used, and summary statistical results relating the self-related processes with

measures of participant daily functioning. These latter data were collected to explore the role of “self” in relation to adjustment and health in the chronic pain population.

Data analysis

Meta-analyses based on random effects method were conducted for correlation coefficients of self-related processes and best represented measures of health outcomes (depression, anxiety, and general psychological health). Statistical package Stata 11.0 was used to conduct meta-analyses. Heterogeneity across studies was quantified by the I^2 statistic, which relates to the variability in effect estimates resulting from methodological diversity across studies rather than chance. The Cochrane handbook's guide for I^2 interpretation was adopted: 0% to 40%, “might not be important”; 30% to 60%, “may represent moderate heterogeneity”; 50% to 90%, “may represent substantial heterogeneity”; 75% to 100%, “considerable heterogeneity” (Higgins & Green, 2005).

Assessment of quality of included studies

A quality assessment inventory was devised based on two high quality and relatively generic quality assessment tools: the Quality Assessment Tool for Quantitative Studies and the Downs and Black Instrument (Downs & Black, 1998; Thomas, 2003). These two tools were identified as among the “six best tools” in a systematic re-view of quality assessment tools (Deeks et al., 2003). Here we adopted criteria that were specifically relevant to the range of study designs identified, not solely clinical trials. The assessment of sample, design, analysis, and reporting quality were covered (The study quality assessment inventory is included in Appendix B). Inter-rater reliability was tested with intraclass correlation coefficient (ICC) for first author and a second author's ratings for each item in the quality assessment inventory. ICC suggested sufficient inter-rater reliability for the quality assessment inventory (Fleiss, 2011). ICC values varied from .78 to .95 across 7 items. There was no variance across raters in one item.

Result

Conceptualization

Fifteen separate self-related variables were identified in the 54 studies included, following a process of review, discussion, and consensus of two authors. These variables included self-esteem, self-concept,

mental defeat, body-self unity, self-schema, attribute loss, role loss, self-concept differentiation, role change, implicit self-pain association, self-discrepancies, self-pain enmeshment, implicative dilemma, self-compassion and decentering. Among these variables the actual definitions of “self” explicitly stated or, more often implied, were identified.

For each study the conceptualization of the self-related variables was analyzed based on the definitions of “self” provided in the studies, or the definition implied by the measurement method used in cases where no explicit definition was available. As there was no prior consensus method for categorizing self-related variables available in the literature these variables were categorized here based on a process of thematic similarity. The lead author extracted definitions and proceeded to group the most similar variables together based on these, until reaching a point before apparently distinct categories were meshed. The groupings were discussed with a second author and the variables were regrouped until a consensus was reached that the categories were maximally internally similar and also distinct from each other. This process was informed by an awareness of descriptive, evaluative, and contextual functions of language and, of course, done with an awareness of the distinction between the conceptualized self versus contextual self from the psychological flexibility model.

Initially four categories of self were identified from the fifteen self-related variables. The first included thirty-two studies investigating an evaluative sense of self, including self-esteem, self-concept, mental defeat, and body-self unity. Consistent with common use variables grouped under this category reflect a sense of self in the form of judgement of the person's value, worth or condition (Merriam-Webster's online dictionary, 2014). The second category included eight studies investigating an attribute-based, role-based or descriptive sense of self, including role change, attribute loss, role loss, self-concept differentiation, self-schema, and implicit self-pain association. Again, consistent with common use, these variables reflect inherent characteristics, the part a person plays, such as in a group, or their appearance or perceptible qualities (Merriam-Webster's online dictionary, 2014). The third category, which appeared highly related to the second, included six studies investigating a sense of self in conflict or self inconsistency, including implicative dilemma, self-discrepancies, and self-pain enmeshment. Variables grouped under this category reflect a sense of self in the form of inconsistency of attributes of the person in different domains or under different circumstances, such as the discordance of the

attributes one considers oneself to have versus the attributes one hopes to have. And finally, the fourth category included eight studies investigating a sense of self that is detached from self-evaluation, description, or attributes, including self-compassion and decentering. Variables grouped under this category reflect a sense of self in the form of separation or de-identification from evaluative or descriptive qualities, a self that is the setting for the content of psychological experiences but not defined by that content, a sense that clearly reflects a “con-textual” quality. Subsequent to the initial categorization of variables the second and third category were combined into one because they were not deemed distinct in their root model of self, in that the “in conflict” aspect is clearly secondary to the core view of self included. The self categories examined further then included three, from this point referred to as “evaluative,” “descriptive,” and “contextual.” Table 1 includes a list of studies reviewed and the self-related variables identified within them. A detailed table of characteristics of studies is included in Appendix C.

Table 1 Studies reviewed and the self-related variables included

Category	Self-related variables	Study
Evaluative self	Self-concept	Armentrout (1979) Thomas and Lyttle (1980) Beekman, Axtell, Noland, & West (1985) Schimit (1985) García-Martínez, De Paz, and Márquez (2012)
	Self-esteem	Schimit (1984) Fitzpatrick, Newman, Lamb, and Shipley (1988) Cornwell & Schmitt (1990) DeVellis et al. (1990) Marbach, Schleifer, and Keller (1990) Christian (1993) Skevington (1993) Krol et al. (1994) Penninx et al. (1997) Druley and Townsend (1998) Krol et al.(1998) Sheasby, Barlow, Cullen, and Wright (2000) Barlow, Wright, and Kroll (2001) Guillemin, Virion, Escudier, de Talancé, and Weryha (2001) Suurmeijer et al. (2001) MacKinnon and Miller (2003) Nagyova, Stewart, Macejova, van Dijk, and van den Heuvel (2005) Covic, Tyson, Spencer, and Howe (2006) Michielsen, Van Houdenhove, Leirs,

Descriptive self	Mental defeat	Vandenbroeck, and Onghena (2006)
		Reneman et al. (2008)
		Schiphorst Preuper et al. (2008)
		Chang et al. (2009)
		Bode et al. (2010)
		García-Martínez et al. (2012)
		Bengtsson et al. (2013)
		Tang, Salkovskis, and Hanna (2007)
		García- Campayo et al. (2010)
		Tang et al. (2010)
Descriptive self	Body-self unity Self-schema	Tang, Shum, Leung, Chen, and Salkovskis (2013)
		Bode, van der Heij, Taal, and van de Laar (2010)
		Calfas, Ingram, and Kaplan (1997)
		Pincus et al. (1993)
		Pincus, Pearce, and McClelland (1995)
		Role-loss
		Attribute-loss
		Self-concept differentiation
		Role change
		Implicit self-pain association
Contextual self	Self-discrepancy	Grumm, Erbe, von Collani, and Nestler (2008)
		Ryckeghem et al. (2013)
		Waters, Keefe, and Strauman (2004)
		Morley, Davies, and Barton (2005)
		Goossens et al. (2010)
		Huijnen et al. (2011)
		Kindermans et al. (2011)
		Compañ et al. (2011)
		Sutherland & Morley (2007)
		Morley et al. (2005)
Contextual self	Self-pain enmeshment	Sutherland & Morley (2007)
		Compañ et al. (2011)
		Implicative dilemma
		Self-compassion
		Costa and Pinto-Gouveia (2011)
		Wren et al. (2012)
		Costa and Pinto-Gouveia (2013)
		Shadick et al. (2013)
		Vowles, Sowden, and Ashworth (2014)
		Vowles, Witkiewitz, Sowden, and Ashworth (2014)
Contextual self	Decentering	McCracken, Gutiérrez-Martínez, and Smyth (2013)
		McCracken, DaSilva, Skillicorn, and Doherty (2014)

The evaluative self: self-esteem, self-concept, mental defeat, and body-self unity

As a variable of long-standing research interest, self-esteem is the most studied self-related variable in chronic pain among those identified in the current review. Twenty-five studies investigated self-esteem

in relation to daily functioning or as a treatment outcome. While explicit definitions of self-esteem were absent in most of the studies, an evaluative sense of self can be identified from the explicitly or implicitly stated definitions of self-esteem, or the measures used to assess self-esteem. The most often used measure, in seventeen studies, was the Rosenberg Self-Esteem Scale in which self-esteem is defined as personal worth or worthiness (Baumeister, Smart, & Boden, 1996), but again this definition was rarely stated. In three studies it was regarded as a general feeling, appraisal or evaluation of self-worth (Coopersmith, 1967; MacKinnon & Miller, 2003; Michielsen et al., 2006; Nyklíček & Kuijpers, 2008), or in another as simply "an overall self-evaluation" (Bode et al., 2010). Overall the conceptualization of self-esteem was somewhat inconsistent, even including use of the term interchangeably with other variables, such as self-concept (Christian, 1993; Nagyova et al., 2005).

As with self-esteem an evaluative self also underlies the investigation of self-concept. Five studies investigated self-concept. The definition of self-concept was only stated in two studies as "perception of one's own worth (Beekman et al., 1985), and "evaluation of different aspects of oneself" (Armentrout, 1979).

A closely related evaluative self-related variable is included in what is called "mental defeat," a variable that appeared in four studies. It has been applied to characterize the impact of chronic pain on self-concept. In essence mental defeat has been defined as a type of negative self-evaluation resulting from pain experiences (García-Campayo et al., 2010; Tang et al., 2010; Tang et al., 2013).

One study investigated body-self unity (Bode et al., 2010). Body-self unity was defined as the perceived unity between the individual's body and the self. The term "self" is asserted here without further elaboration or definition. However an evaluative sense of self is clearly implied in the description of the experience of body-self unity as "a positive experience of the own body" or "experiencing the body as an unworthy part" (Bode et al., 2010).

Descriptive self: self-schema, attribute loss, role loss, self-concept differentiation, role change, implicit self-pain association, self-discrepancies, self-pain enmeshment and implicative dilemma

Three studies of self-schemas focused on a sense of self based on one's own self-generated attributes. Self-schema was not uniformly defined across the three studies, but was essentially referred to as a cognitive structure stored in memory and influencing self-relevant information processing (Pincus et al., 1993; 1995; Calfas et al., 1997). Methods to examine self-schema typically required participants to endorse or rate adjectives (attributes) in terms of self-descriptiveness.

The sense of self as a cognitive structure was also implied in the studies investigating the association between pain and self, referring to this as implicit pain-self association in one study and the association between self- and pain-schema in another (Grumm et al., 2008) (Van Ryckeghem et al., 2013). Implicit pain-self association was referred to as “cognitions concerning the connection between pain and self” and is based on notions of implicit associative learning.

In two studies changes in attributes and roles over time were examined as indices of identity (Harris et al., 2003; Toal-Sullivan & Henderson, 2004). The process of generating attributes or roles at different time points is clearly an attribute-based self-descriptive process. Similarly, inconsistency in attributes was investigated as self-discrepancy and self-pain enmeshment based on self-discrepancy theory (Higgins, 1987). Self-discrepancy theory hypothesizes that discrepancies between the actual self-state (the self-concept) and other self-states, such as ideal self-states (representations of an individual's beliefs about his or her or a significant other's hopes, wishes, or aspirations for the individual), is associated with certain kind of emotional discomfort. Six studies were identified investigating self-discrepancy in the context of chronic pain. In one study discrepancies related to self and chronic pain were interpreted as the “conditionality” of the future self based on the existence of pain, also referred to as the degree of self-pain enmeshment. It was proposed that emotional adjustment, specifically depression, was partly determined by the extent to which different aspects of the self were enmeshed with pain (Pincus & Morley, 2001).

One study examined a pain-specific construct namely “implicative dilemma”(Compañ et al., 2011). Implicative dilemma was defined as a type of cognitive conflict where the construct re-presenting the undesirable symptom comes to interact with core constructs, usually desirable positive characteristics

of the self-identity system. The base of self-identity here is a self-descriptive process, and once again there is a key focus on discrepancy or conflict as the key issue (Kelly, 2003).

Contextual self, distinct from the descriptive or evaluative senses of self: self-compassion and decentering

Eight studies focused on non-evaluative, “transcendent,” or contextual senses of self. Six studies examined self-compassion in chronic pain. Wren et al. (2012) defined self-compassion as the quality of being touched by one's own suffering and feeling compelled to help alleviate one's own difficulties. The researchers further explained self-compassion using Neff's self-compassion model (Neff, 2004). According to this model, self-compassion entails self-kindness, common humanity, and mindfulness. In two studies self-compassion was rooted in the evolutionary model of social mentality theory, which relate self-caring to processes of caring for others, which is in turn related to important socially-mediated processes of survival (Gilbert & Allan, 1998; Costa and Pinto-Gouveia, 2011, 2013). Three studies did not explicitly include definitions of self-compassion (Shadick et al., 2013; Vowles, Sowden, & Ashworth, 2014; Vowles, Witkiewitz, Sowden, & Ashworth, 2014). In contrast to the previous variables, self-description or self-evaluation are not included in self-compassion as a defining feature of self. On the contrary, self-compassion taps into a caring and kind but ultimately non-judgemental sense of self, and a distinction between self and evaluation.

Two studies investigated a variable called “decentering” (McCracken, Barker, & Chilcot, 2014; McCracken et al., 2013). Decentering was defined as the ability to observe one's thoughts and feelings in a detached manner, as temporary events in the mind, as neither necessarily true nor reflections of the self (Fresco et al., 2007). Once again in contrast to previous variables, decentering taps into an essentially non-evaluative sense of self.

Summary of self-related variables

In summary, there are numerous and wide ranging self-related variables under investigation in relation to chronic pain. Further, within these variables the definitions of self vary and are not always explicit. Among the fifteen self-related variables identified there appear to be a patterns in the particular senses of self that they include. First, most studies are based on an evaluative sense of self. Secondly, and in

a related vein, there are numerous studies that focus on self-based on attributes. Included in this group are those studies that specifically examine processes of in-consistency or conflict in attributes and other experiences that may threaten or contradict these. Finally, there are studies that include a sense of self that is explicitly not based in evaluations or attributes. These examine a self that is caring, open, transcendent, separate, or distinct from these. Also included in these latter studies are processes of self-awareness. Perhaps the sharpest distinction among the senses of self reflected here is between those that identify self as evaluation and descriptive attributes and those that specifically detach or de-identify from these. Although both senses of the self were examined in the studies included in the review, most, forty-six out of fifty-four, focused on senses of self based on verbal-evaluative and verbal-descriptive processes and not on senses that are separate from or above these, what we have referred to here as a “contextual” sense of self.

Measurement

Multiple methods, including questionnaires, interviews and experimental manipulations, were applied to reflect and investigate the identified self-related variables. Among the fifteen variables, self-esteem, self-concept, mental defeat, body-self unity, self-compassion, and decentering were measured utilizing questionnaires. Attribute loss, role loss, self-concept differentiation, role change, self-discrepancies, self-pain enmeshment and implicative dilemma were measured based on attributes generated by participants through interview. Self-schemas and self-pain association were measured utilizing experimental methods.

Questionnaire

Fourteen questionnaires have been used in studies of self-related variables and pain. Table 2 demonstrates the questionnaires used to measure these variables.

Table 2 Summary of questionnaires used to measure self-related variables

Variable	Questionnaire	Subscales (if applicable)								Key references
			Study	Items	CTV	IC	CRV	CV	R	
Self-esteem	Rosenberg Self-Esteem Scale (RSE)		17	10	?	0	?	?	+	Blascovich & Tomaka (1991), Sheasby et al. (2000)
		Coppersmith Self-Esteem Inventory	1	25	?	?	?	?	?	
		(short form, long form)	1	50	?	?	?	+	+	Taylor and Reitz

								(1968)	
	WHO Quality Of Life Brief Form	1	26	?	?	?	?	+	Chang et al. (2009)
	· Physical								
	· Psychological (one item measuring self-esteem)								
	· Social relationship								
	· Environment								
	Duke Health Profile	1	17	?	0	?	+	+	Guillemin et al. (2001)
	· Physical								
	· Mental								
	· Social								
	· General								
	· Perceived health								
	· Self-esteem								
	PERI Demoralization Scale Poor Self-Esteem subscale	1	27	?	-	?	?	?	Dohrenwend and Dohrenwend (1981)
	· Dread								
	· Anxiety								
	· Sadness								
	· Helplessness-Hopelessness								
	· Psychophysiological symptoms								
	· Perceived physical health								
	· Poor self-esteem								
	· Confused thinking								
	Single item measure: "On the whole I am satisfied with myself"	1	1	-	?	?	?	?	Penninx et al. (1997)
	Three items from RSE + one newly-developed item ("There is really no way I can solve the problems I have.")	1	1	-	0	?	?	?	Druley and Townsend (1998)
	Self- esteem questionnaire	1	?	?	?	?	?	?	
	Carlson Adjective Checklist (list of self-descriptive adjectives)	1	30	?	?	?	+	?	Skevington (1993)
	· Social self-esteem								
	· Personal self-esteem								
Self-concept	Tennessee Self Concept Scale (TSCS)	3	90	?	?	?	+	?	March and Richards (1988)
	· Physical								
	· Moral								
	· Personal								
	· Family								
	· Social								
	· Academic/work								
Mental Defeat	Pain Self Perception Scale (PSPS)	4	24	0	0	?	+	+	Tang et al. (2007), García-Campayo et al.(2010)
Body -self unity	Body Experience Questionnaire	1	10	+	0	?	?	?	Bode et al. (2010)
	· Alienation								
	· Harmony								

Self-compassion	Self-Compassion Scale	6	26	?	0	?	+	+	Costa and Pinto-Gouveia (2011), Wren et al. (2012), Shadick et al.(2013), Vowles, Sowden, and Ashworth (2014)
	· Self-kindness								
	· Self-judgment								
	· Common humanity								
	· Isolation								
	· Mindfulness								
	· Over-identification								
Decentering	Experiences Questionnaire (EQ)	2	20	0	0	?	+	?	Fresco et al. (2007)
	· Decentering								
	· rumination								

Notes. CTV=content validity; IC=internal consistency; CRV=criterion validity; CV=construct validity;

R=reproducibility. Rating: +=good; 0=intermediate; -=weak; ?=no information available.

Through application of the quality assessment checklist adopted in the review, reliability and validity of the questionnaires identified were assessed. We adopted the rating system of a psychometrics review study (Reneman, Dijkstra, Geertzen, & Dijkstra, 2010). Criteria were rated based on strength of evidence as follows: ‘p’ for good, ‘0’ for intermediate, ‘-’ for weak, and ‘?’ was assigned when no information on that criterion was found in the paper or the reference paper. (See Appendix D) Table 2 demonstrates a summary of the questionnaires identified. Detailed rating criteria are available from the corresponding author.

Among the fourteen questionnaires identified, none met all psychometric property criteria. Criterion validity was not reported for any questionnaire, and only two were reported at least adequate internal consistency and construct validity.

Interview

Five semi-structured interviews have been used in nine studies of self and pain. Table 3 summarizes studies using interviews, the variables investigated, and psychometric properties of the interviews.

Although different interviews were conducted to measure different self-related variables, all interviews served to facilitate generating self-descriptive attributes or roles, which were then quantified to represent self-related variables. Different from questionnaires discussed above, interviews utilized in the identified studies measured self-related variables in an indirect way, which was less susceptible to

subject bias. However, the reliability and validity of the interviews, except for the Selves Questionnaire developed by Higgins and colleagues were unclear (Higgins, 1987).

Table 3 *Interviews used to measure self-related variables*

Variable	Studies	Interview		Psychometric properties
		Generating attributes/roles	Quantifying attributes/roles	
Attribute loss	1	Prior to onset of pain(past) & present moment (now)	Attribute no. (past) – attribute no. (now)	Not reported
Role loss	1	Prior to onset of pain(past) & present moment (now)	Role no (past) – role no (now)	
Self-concept differentiation	1	Unique attributes (attributes occurred once)	Unique attributes/ total no. of attributes	
Role change	1	Generate roles, value roles, rate satisfaction of role-performance	Not clearly defined	Not reported
Self-discrepancy	6	For different self-domains (e.g. actual self, ideal self, ought self)	No. of mismatching attributes in one domain (antonymous of the words describing actual self) – no. of matching attributes in the domain (synonymous of the words describing actual self) or Rate the extent to which each attributes apply to participants themselves	Selves Questionnaire by Higgins (Higgins et al., 1986): standard scoring method, reliable and valid Interviews adapted from the Selves Questionnaire: not reported
Self-pain enmeshment	2	For different self-domains	(1) Judge if the future selves were possible with (for hoped-for self) or without (for feared self) pain (2) Attributes conditional on pain/ total attributes	Adapted from the Selves Questionnaire: not reported
Implicative dilemma	1	Attributes and personal constructs for actual self and ideal self	GRIDCOR 4.0 computer program (based on correlation between a discrepant construct (present self and ideal self score at opposite poles of the construct) and a congruent construct (present self and ideal self score at same pole of the construct)	Classification of constructs reliable: Cohen's Kappa = .93

Experiment

Two experimental methods were used to measure self-esteem, self-schema, and implicit self-pain association. Table 4 summarizes these experimental methods. In essence, the two experimental techniques were utilized to detect the association between words reflecting self-related content and words reflecting pain. Only one, the Implicit Association Test, showed evidence of adequate psychometric properties, and therefore provided relatively strong evidence.

Table 4 *Experimental methods used to measure self-related variables*

Variable	Experimental method	Method description	Assumption	Psychometric properties
Self-schema	Self-description task + recall task	(1) Participants rate the extent to which the pain-related and self-related words describe themselves (2) Participants recall the words rated in self-description task	Better recall of content- congruent words (e.g. better recall of pain-related words in pain patients)	Not reported
Implicit self-pain association	Implicit Association Task (IAT)	Participants categorize words of four categories (self, other, pain, pain-free) by pushing buttons assigned to each category as fast and accurate as possible Response time was managed using D600 software; Pain/pain-free words were assigned to the same/different button as self/other words	People are faster to categorize stimuli related to two associated concepts in the same way (by pushing the same button) than to categorize these stimuli in a different way (by pushing a different button) A stronger association between “self and pain” (self-pain- words assigned to same button) and “other and free of pain” (other- free of pain- words assigned to same button) than “self and free of pain” and “other and pain” indicated a stronger association between pain-schema and self-schema. Vice versa	Reviewed as adequate (Nosek, Greenwald & Banaji, 2007)
Self-esteem		Categories: self, other, positive, negative	A stronger association between “self and positive” and “other and negative” indicated higher self-esteem	

Summary of measures

Consistent with the multiple conceptualizations identified here, multiple measures or methods have been applied. Self-related processes have been measured explicitly utilizing questionnaires, and implicitly utilizing interviews and experimental methods. Fourteen questionnaires have been used to investigate evaluative self, as well as contextual self. Five semi-structured interviews have been used to explore conflict or inconsistency in attribute-based self and implicative dilemma. Two experimental techniques have been used in studies of descriptive self.

Evidence

In an attempt to gauge the role of self-related variables in chronic pain an examination of available evidence was under-taken. Outcomes of interest initially included measures of either physical or psychological functioning. Evidence was identified mostly in correlation studies, but also in group studies comparing people with chronic pain to those without, and in treatment studies where the self variables were used as outcomes. Table 5 shows the magnitude of observed relations between self-related variables and measures of functioning from the correlation studies. Among all outcomes investigated in relation to self-related variables, only three (depression, anxiety, and general psychological health) included enough studies for meta-analysis, therefore meta-analyses of correlation coefficients of self-related variables and measures of the three health outcomes were conducted by self category. Figs. 2–4 show the correlations effect size of each study and pooled effect sizes of each variable category for depression, anxiety, and general psychological health respectively.

Table 5 *Pearson's correlation coefficient for self-related variables and measures of functioning (direction is set in all case so higher score goes with higher level of the construct measured).*

Study	Self-related variable	Functioning	N	r
<i>Evaluative self</i>				
DeVellis et al.(1990)	Self-esteem	Depression (CES-D)	71	-.68 ^a , ***
Krol et al.(1994)	Self-esteem	Psychological health (GHQ-28)	292	.47***
Penninx et al.(1997)	Self-esteem (healthy control)	Depression (CES-D)	719	-.18*
	Self-esteem (mild arthritis)	Depression (CES-D)	612	-.30***
	Self-esteem(severe arthritis)	Depression(CES-D)	359	-.21***
Krol et al.(1998)	Self-esteem (follow-up-baseline)	Depression (CES-D)	465	-.20**
Nagyova et al.(2005)	Self-esteem	Psychological health (GHQ-28)	160	.30***

		baseline		
		Psychological health(GHQ-28) 36-month		.40***
Tang et al.(2007)	Mental defeat	Depression (HADS)	126	.65 ^a ,***
		Anxiety(HADS)		.62 ^a ,***
		Pain intensity (SF-MPQ-VAS)		.41 ^a ,***
Tang et al.(2010)	Mental defeat	Depression (HADS)	133	.66**
		Anxiety (HADS)		.60**
		Psychological disability(PDQ)		.61**
		Pain interference(BPI)		.51**
		Functional disability(PDQ)		-.49**
García-Campayo et al. (2010)	Mental-defeat	Depression(HADS)	250	.51***
		Anxiety(HADS)		.48***
		Global functioning (FIQ)		-.39***
García-Martínez et al. (2012)	Self-esteem (improvement)	Psychological health (MCS of SF-36)	28	.61**
		Physical functioning (PCS of SF-36)		.56**
	Self-concept (improvement)	Psychological health (MCS of SF-36)		.46*
		Physical functioning (PCS of SF-36)		.51*
Tang et al.(2013)	Mental defeat	Depression(HADS)	84	.51**
		Anxiety(HADS)		.50**
		Pain interference(BPI)		.40**
	<i>Descriptive self</i>			
Harris et al.(2003)	Role loss	Depression(BDI)	80	.26**
	Attribute loss	Depression(BDI)		.30**
	Self-concept differentiation (pre-pain)	Depression(BDI)		ns
	Self-concept differentiation (current)	Depression(BDI)		ns
Van Ryckeghem et al. (2013)	Implicit self-pain association	Depression(HADS)	126	ns
		Anxiety (STAI-T)		.32 ^a ,**
		Pain severity (MPI)		ns
		Pain suffering (MPI)		.35**
Waters et al.(2004)	Self-discrepancy(actual-ideal)	Depression(BDI)	93	.37*
	Self-discrepancy(actual-ought other)	Psychological distress		.54*
	Self-discrepancy(actual-ideal)	Psychological distress		.25*
Morley et al.(2005)	Self-discrepancy (actual-hoped)	Depression(BDI)	89	.18*
	Self-pain enmeshment	Depression(BDI)		.34**
Sutherland and Morley (2007)	Self-discrepancy (actual hoped)	Depression (BDI)	82	.19*
	Self-pain enmeshment	Depression(BDI)		.21*
	Self-discrepancy (actual-hoped other)	Depression(BDI)		.22*
	Self-pain enmeshment (other)	Depression(BDI)		ns
Goossens et al.(2010)	Self-discrepancy (actual-ought other)	Depression(BDI)	89	.33**
		Anxiety(STAI-T)		.35**
	Self-discrepancy (actual-feared)	Depression(BDI)		.33*
		Anxiety(STAI-T)		.28*
Kindermans et al.(2011)	Self-discrepancy (actual-feared)	Depression (BDI)	83	.35***
		Anxiety (HADS)		.36***
	Self-discrepancy (actual-feared)	Depression (BDI)		.33***

	other)	Anxiety (HADS)	.35***
	<i>Contextual self</i>		
Costa et al.(2011)	Self-compassion	Depression(DASS)	103 -
			.61 ^a ,***
		Anxiety(DASS)	-
			.37 ^a ,***
Wren et al.(2012)	Self-compassion	Negative affect (PNAS)	88 -.45***
		Positive affect (PNAS)	.26**
		Pain disability (PDI)	-.22*
		Pain (VAS)	ns
Costa et al.(2013)	Self-compassion	Depression (DASS)	103 -.31***
		Anxiety (DASS)	-.12***
McCracken et al.(2013)	Decentering	Depression (BCMDI)	150 -.24**
		Psychological disability (SIP)	-.28**
McCracken et al.(2014)	Decentering	Depression (PHQ-9)	352 -.45**
		Psychological health (SF-36)	.41**
		Social functioning (SF-36)	.32**

Notes: CES-D: Center for Epidemiological Studies Depression Scale; GHQ-28: General Health Questionnaire-28; HADS: Hospital Anxiety and Depression Scale; PDQ: Pain Disability Questionnaire; FIQ: Fibromyalgia Impact Questionnaire; BPI: Brief Pain Inventory; MPI: Multidimensional Pain Inventory; BDI: Beck Depression Inventory; STAI-T: State-Trait Anxiety Inventory- Trait; DASS: Depression Anxiety Stress Scales; PNAS: Positive and Negative Affect Scale; PDI: Pain Disability Index; VAS: 0-100mm visual analogue scale; SIP: Sickness Impact Profile; PHQ-9: Patient Health Questionnaire-9.

* Significance level: <.05.

** Significance level: <.01.

***** Significance level: <.001.

^a Statistical analysis not adjusted (e.g. ANOVA instead of ANCOVA, regression not controlled for any potential confounders).

Self and depression

Depression was examined in relation to nine self variables in nineteen studies, which is the most examined outcome in the review. Fig. 2 summarizes the results. The nine variables were significantly correlated with depression with a range from small ($r = .18$) to large ($r = .68$) effect sizes, with medium pooled effect sizes for self-related variables of all categories ($r = .47, .33, .41$). As I^2 suggested, there was considerable heterogeneity across studies of evaluative self and contextual self respectively. In general, self-esteem, self-compassion and decentering were negatively associated with depression, while higher level of mental defeat, attribute loss, role loss, and self-discrepancies were predictive of higher level of depression. It was also observed in an ACT treatment context that increases in self-compassion mediated improvements in depression and anxiety (Vowles, Witkiewitz, Sowden, and Ashworth, 2014).

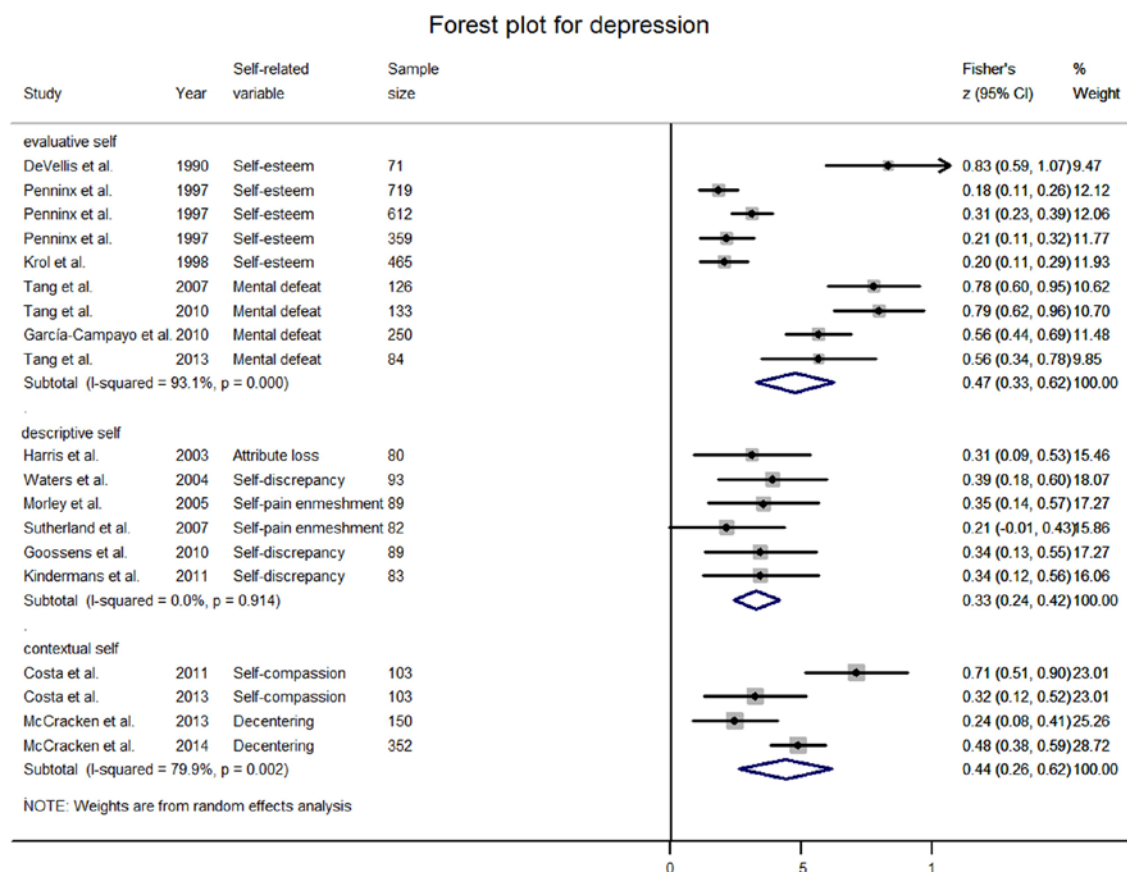


Fig. 2 Forest plot from meta-analyses of the correlations between self-related variables and depression

Self and anxiety

Anxiety was examined in relation to four self variables in nine studies. Fig. 3 summarizes these results. In general, mental defeat, self-discrepancies, self-pain implicit association were positively related to anxiety with small ($r=.28$) to large ($r=.62$) effect sizes, while a higher level of self-compassion was correlated with lower level of anxiety with a small effect size ($r=.12$). A large pooled effect size was found for evaluative self ($r=.56$), medium for descriptive self ($r=.37$), and small for contextual self ($r=.25$). Again, I^2 suggested substantial heterogeneity across studies of evaluative self and contextual self.

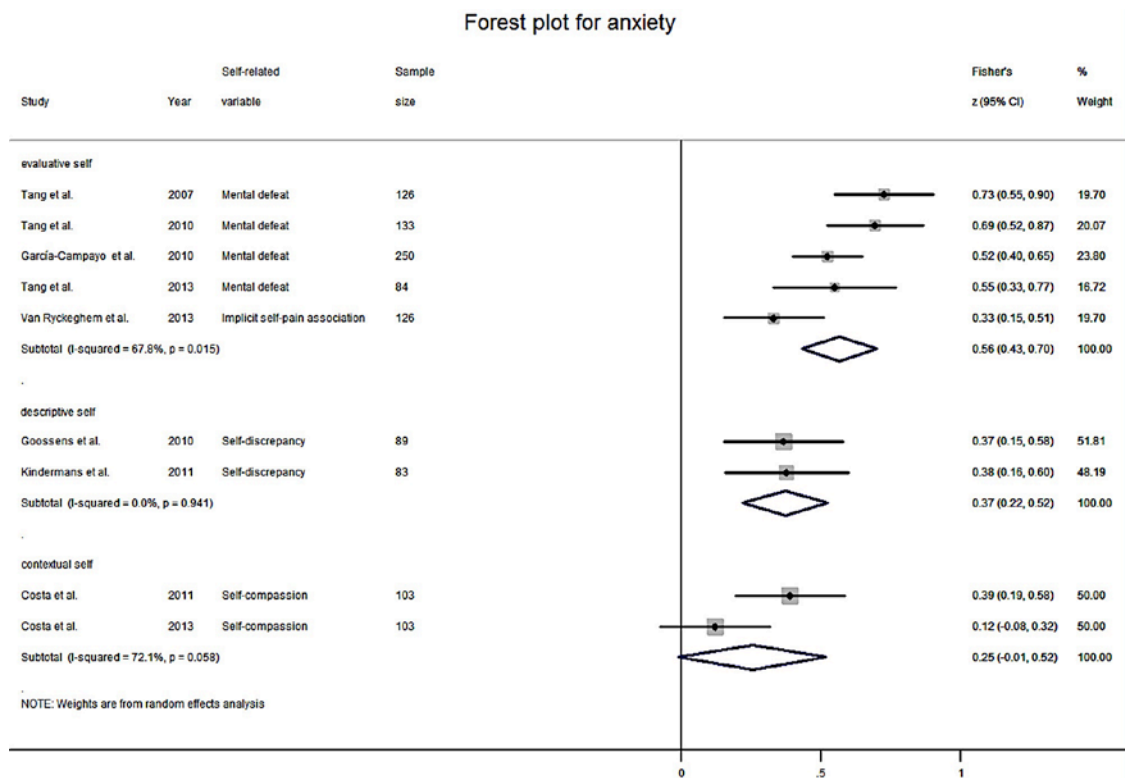


Fig. 3 Forest plot from meta-analyses of the correlations between self-related variables and anxiety.

Self and general psychological health

General psychological health was examined in relation to five self variables in six studies. Fig. 4 demonstrates the correlational evidence of the relationship between self-related variables and general psychological health. The five self-related variables were significantly correlated with general psychological health with a range of small ($r=.25$) to large ($r=.61$) effect size. Large pooled effect sizes were found for evaluative self ($r=.56$) and medium for contextual self ($r=.37$). No pooled effect size was calculated for descriptive self, as there was only one study under this category measuring general psychological health. I^2 suggested substantial heterogeneity across studies of evaluative self and descriptive self respectively. In general, self-esteem, decentering and self-compassion were positively associated with psychological functioning, while higher level of mental defeat and self-discrepancies were associated with lower level of general psychological health.

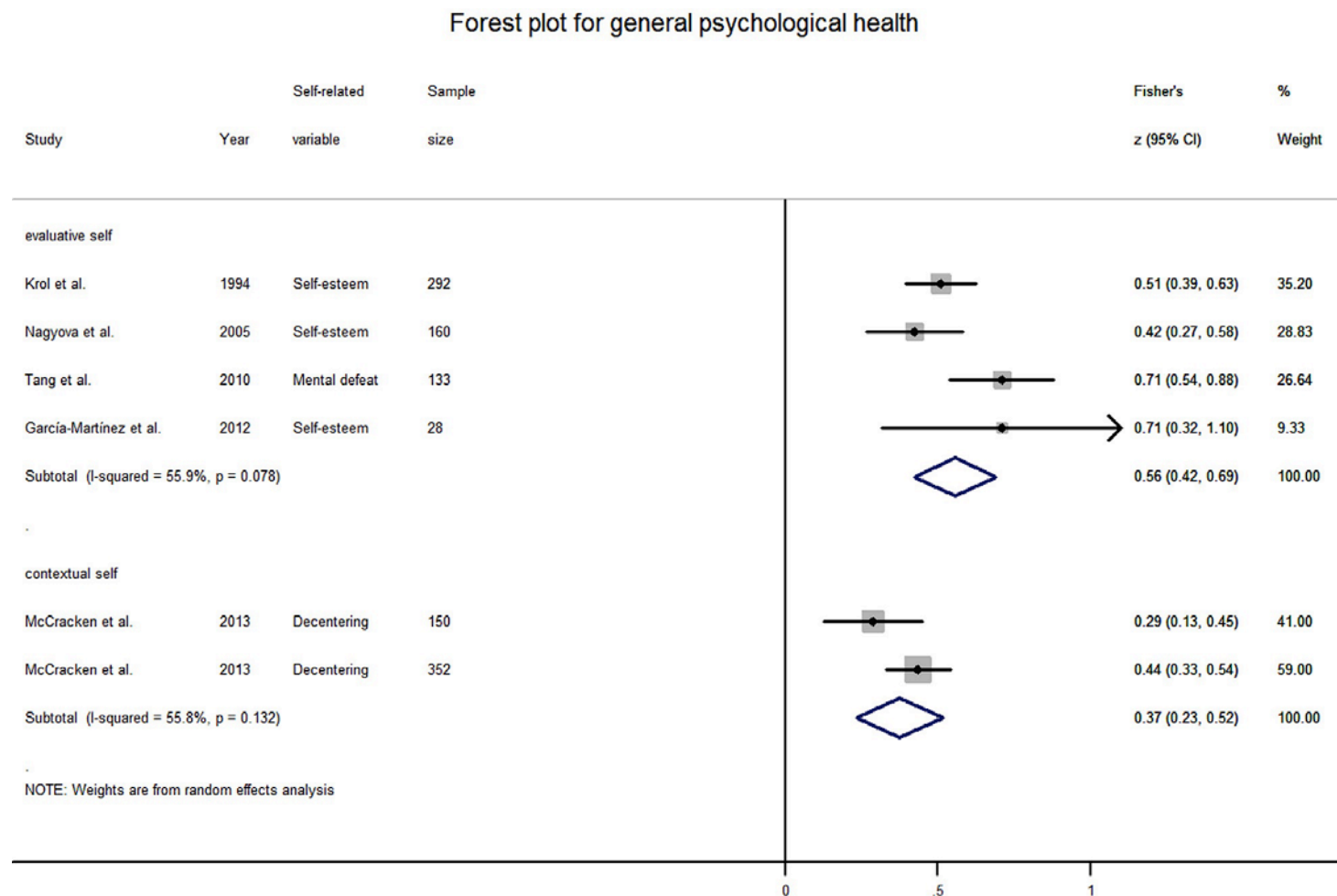


Fig. 4 Forest plot from meta-analyses of the correlations between self-related variables and general psychological health

Self, pain, and physical functioning

There were too few studies addressing the relationship of self-related variables with pain and physical functioning, thus a meta-analysis was not appropriate. Correlational evidence is summarized in Table 5. Nonetheless in general, positive evaluative processes of self tended to be associated with lower pain and better general physical functioning. In addition, self-esteem was investigated in relation to physical functioning including immune function, quality of occupation, and aerobic fitness, and an association was found with a small to medium effect size ($r=.12-.32$) (Chang et al., 2009; MacKinnon & Miller, 2003; Marbach et al., 1990).

Other evidence

Self-related variables were also investigated in group comparison studies and in treatment studies as treatment outcomes. In general psychological treatment appears to improve positive evaluative measures of self, and people with chronic pain conditions, in comparison to those without, reflect more positive evaluations of, and associations with, the self. Table 6 summarizes these results.

Table 6 Evidence of group comparison studies and treatment studies examining self-related variables as outcomes

Study	Variable	Design		Result
<i>Evaluative self</i>				
Schmidt (1985)	Self-esteem	Group comparison	Chronic pain vs healthy control	Lower level in chronic pain
Fitzpatrick et al. (1988)	Self-esteem	Cross-sectional	Correlation with social relationship	Higher availability and satisfaction of social relationships correlated with higher self-esteem ($r=.19-.35$)
Barlow et al. (2001)	Self-esteem	Cohort	Intervention group vs control (arthritis patients)	Higher improvement of self-esteem in intervention group ($p=.002$)
Guillemin et al. (2001)	Self-esteem	Cohort	Single treatment group	Higher change score during the treatment than during the four weeks before onset of treatment
MacKinnon and Miller (2003)	Self-esteem	Group comparison	Rheumatoid arthritis vs healthy control	No significant difference
Grumm et al. (2008)	Explicit self-esteem (RSE) Implicit self-esteem (IAT)	Cohort	(1)Within fibromyalgia group (2)Fibromyalgia vs healthy control	(1) Improved over treatment ($r=.56$) (RSE);No significant difference (IAT) (2)Higher change score in FM ($r=.50$) (RSE); No significant difference (IAT)
García-Martínez et al. (2012)	Self-esteem	RCT	Fibromyalgia (FM) vs healthy control	Greater improvement in FM
Beekman et al. (1985)	Self-concept	Cohort	Back pain patients vs Rheumatoid Arthritis controls	Intervention group improved on 8 out of 10 subscales of TSCS
Sheasby et al (2000)	Low/negative self-concept	Group comparison	Chronic pain vs health control	Higher level in chronic pain
Tang et al (2007)	Mental defeat	Group comparison	Chronic pain vs healthy control	Higher level in chronic pain
<i>Descriptive self</i>				
Van Ryckeghem	Implicit self-pain	Group	Chronic pain vs healthy control	Association of self and pain schema was stronger in chronic pain group

et al. (2013)	association	comparison Experiment(words recall task)		Poorer recall of non-depression words in Irritable Bowel Syndrome than Major Depression
Pincus et al. (1993)	Self-schema	Experiment (words recall task)	Self-referent stimuli vs other-referent stimuli (pain patients)	Recall more sensory words in self-referent condition
Pincus et al. (1995)	Self-schema	Experiment (words recall task)	Self-referent stimuli vs other-referent stimuli (depressed pain patients)	Better recall of negative pain words in self-referent condition
Compañ et al (2011)	Implicative dilemma	Group comparison	Fibromyalgia vs healthy control	More likely in fibromyalgia group
Shadick et al. (2013)	<i>Contextual self</i> Self-compassion	Cohort	Intervention group vs controls	Treatment effect continued to improve after post-treatment in intervention group, but did not sustain in control group

Summary of evidence

The studies described above included remarkably different aspects of the self, and adopted diverse methods. For instance, for self-esteem alone, nine questionnaires and one experimental method were used to measure the variable, and various study designs were adopted including cross-sectional, group comparison, cohort, and experimental. With this caveat, the evidence tends to suggest that malfunctioning in the evaluative or descriptive senses of self, including the negatively evaluated self, or the descriptive self in conflict, is associated with problematic psychological and physical adjustment in chronic pain patients, while detachment from these senses of the self (i.e., contextual self), including decentering and self-compassion, is associated with beneficial adjustment.

Among the fifty-four studies reviewed, only eight are of good quality with representative samples, internally valid designs, and appropriate statistical analysis. Twenty-one studies are of moderate quality and twenty-five weak. All studies were clearly re-reported. Low quality was mostly due to samples that were not adequately representative of the studied population. Furthermore, most experimental studies and some of the cross sectional studies included instruments, such as interviews, with unclear reliability and validity. The majority of the studies adopted a cross-sectional design, which also limited the strength of the evidence. Only nine studies utilized longitudinal data.

Discussion

This review provides an examination of self-related variables in chronic pain: the conceptualization, measurement and the resulting evidence. Fifteen variables were identified in the fifty-four studies included in the review. The studies are characterized by wide ranging conceptualization and measurement methods. Three distinct categories of self emerge, which we classified at one level as evaluative, descriptive, and contextual. In general these can be regarded as reflecting two overarching dimensions of self mirroring the conceptualized self, or self-as-content, and the self-as-context dimensions from the PF model (McHugh & Stewart, 2012). This distinction between the conceptual self and self-as-context is similar to the longstanding psychological distinction between self as “me” versus self as “I” (James, 1890). Similar distinctions within senses of self have been explored in the study of autobiographical memory, where the “I-Self” and the “Me-Self” were argued to relate to autobiographic memory in different ways (Prebble et al., 2013).

From the results obtained here we conclude that the PF model appears useful for organizing studies of self and chronic pain, but perhaps only partially. It does this to the extent applying principles from this model helps reduce 15 variables to a much smaller number of categories and retains a current and psychologically meaningful distinction. This distinction includes the difference between identifying with versus not identifying with the content of psychological experiences. We are not aware of another model of self that can both bridge this distinction and do so in a way that is able to encompass the many varied specific variables included on both sides. The latter result is feasible for the fact that the PF model does not necessarily assume a functional distinction between “I am a worthwhile person,” “I am a friendly person,” or “I am the breadwinner for the family,” and yet it does assume there is a functional distinction between believing “I am worthwhile” versus simply noticing that the thought “I am worthwhile” just appeared within awareness. Of course, the failure in identifying a distinct self-awareness category appears as a misfit between PF and the literature reviewed.

Overall, in terms of the evidence summary, positive self-evaluations were associated with positive pain-related impacts, particularly on measures of depression and emotional functioning. On the other hand a contextual self including greater awareness of one's own experiences was associated with better functioning in the context of chronic pain, again particularly in terms of emotional functioning. The evaluative self showed medium to large average effect sizes and contextual self showed small to medium effects in relation to depression, anxiety and general psychological health; descriptive self showed medium average effect sizes in relation to two of these, depression and anxiety. Evaluative self appeared to demonstrate relatively stronger associations with these measures of emotional functioning; however, substantial heterogeneity was identified for most of the meta-analyses. While firm conclusions on relative strength of associations observed cannot be drawn, in general, it appears that self-related variables may exert important impacts on daily functioning for people with chronic pain.

One of the more important findings of the present review includes the significant lack of precision being applied in definitions of self. On the surface there are fifteen self-related processes. Underneath these are a smaller set of “senses of self”. In the majority of studies a careful definition for how the term “self” is being used is absent and typically seemed implied. Thus, without careful delineation it seemed

expected that the reader will fall back on normal usage of the word implying that self is the person, the essence of the person, or the unity of elements of the person (Merriam-Webster's online dictionary, 2014). As this review shows, however, there can be considerable difference from a scientific point of view in what this essence 'is', or in the elements one is including within this self-identity. The vast majority of studies do not clarify distinctions between senses of self that emerge here from this review.

It is perhaps not surprising that most of the research reviewed here has been focused on various conceptual senses of the self. In a very direct way this reflects the common view, or perhaps bias, held within our everyday perceptions, that success and wellbeing come from thinking and feeling positively about ourselves. Among the fifteen variables identified, thirteen were these senses of the self, including self-esteem, self-concept, self-image, and the selves within mental defeat, body-self unity, self-schema, role change, role loss, attribute loss, self-concept differentiation, implicative dilemma, self-discrepancies and self-pain enmeshment. On the other hand only two variables tapped into contextual self, including self-compassion and decentering. Hence, a contextual view of self certainly remains a minority perspective in this research.

Although some of the self-related variables identified did not explicitly implicate a conceptual sense of the self, the conceptual property underlying the variables can be detected from the measurement of these variables. For instance, there was no definition of "self-concept" in the studies identified, but self-concept was consistently measured using the Tennessee Self Concept Scale which consists of statements rated on a 5-point scale of self-definitions in areas such as family and society. The variables investigated using interview-based approaches also implicitly revealed a conceptual sense in the methods of measurement. For example, the measurement of role loss, attribute loss and self-concept differentiation was based on an interview designed to facilitate participants in generating roles and attributes for them-selves, basically a process of self-describing. Self-discrepancies and self-pain enmeshment were measured through conducting inter-views to elicit words describing personal traits for different self-domains (e.g., actual self, ideal self, ought self) and measuring the discrepancies between actual self and other self-domains. Not only is the process of generating words a process of self-describing but the assignment of the traits to domains, such as ideal self and ought self, is also inherently evaluative.

In contrast to the predominant conceptual approach to self, self-compassion and decentering tapped into a sense of the self where descriptions, evaluations, or judgements are present and at the same time not the central elements. In the studies examining decentering, it was conceived as a process of psychological flexibility (McCracken, et al., 2014; McCracken et al., 2013). Decentering emphasizes an awareness of a distinction between the self and thoughts, including descriptive or evaluative thoughts about the self. An individual acting with a decentered quality is able to observe their thoughts and feelings in a separate manner, or from a distinct point of view, rather than identify themselves as equal to these thoughts and feelings. Similarly, self-compassion involves a kind of caring detachment from one's painful thoughts and feelings, an ongoing awareness and a non-judgemental attitude towards these.

Although there have been few studies investigating the contextual senses of the self, and more evidence is needed to draw firm conclusions, the existing evidence suggests that the detachment or separation from description or evaluation of the self is positively associated with psychological health and with certain physical aspects functioning in chronic pain. Results like these are consistent with the processes proposed within mindfulness-based treatments (Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006; Carmody & Baer, 2008; Carmody et al., 2009; Carmody, Reed, Kristeller, & Merriam, 2008; Nyklíček & Kuijpers, 2008), and in the psychological flexibility model, the model underlying Acceptance and Commitment Therapy (ACT; Hayes et al., 1999). Mindfulness-based treatments and ACT in chronic pain are not focused on promoting positive self-judgements or on solving perceived discrepancies between self-attributes and other experiences. Rather, these treatments are focused on stepping back from identifying with or wrestling with these contents of experience, or reconciling apparent contradictions, and focusing on effective action instead, particularly in ACT (Hayes et al., 2006; Hayes, Villatte, Levin, & Hildebrandt, 2011; McCracken & Vowles, 2014).

As outlined earlier, a developing model of self has been proposed, a model that stems from the same contextual cognitive behavioral roots as ACT and the PF model (Hayes et al., 2006; McHugh & Stewart, 2012), including particular reference to chronic pain (McCracken & Morley, 2014). This functional contextual model of the self includes three selves: self-as-content, self-as-process, and self-as-context.

Again, self- as-content involves processes of identifying with the content of one's thoughts and feelings. Here, essentially, I am what my thoughts say I am. Self-as-process involves ongoing awareness of one's psychological experience, and the ability to use information from these experiences to guide behavior. Self-as-context involves the experience of a distinction between self and the content of one's psychological experiences, a sense of separation, defusion, containing, or being greater than one's experiences (Foody et al., 2012). This model includes both the conceptual and contextual sense of self, as highlighted in the present review, and unifies these under a clear set of core principles and philosophical assumptions, and thus potentially provides an approach to comprehensively investigate the sense of the self.

The current review has certain limitations. First of all, although we used a search strategy adapted from a previous review of self as a variable (Leary & Tangney, 2003) and a Cochrane review of psychological treatments for chronic pain which is relatively inclusive of terms regarding chronic pain relevant studies could have been missed. Secondly, we only included studies published in peer-reviewed journals, for some assurance on research quality, but more studies could be identified from other resources such as books, conferences and "gray" literature. In addition, we only included quantitative studies in order to examine evidence for the self-related variables in a consistent way. However, it is clear that sense of the self is a phenomenon that presents measurement challenges, and qualitative methods could complement this approach. Our search was limited to English language publications while there were clearly non-English studies identified through the preliminary search. Another limit resides with our categorization or organizing strategy for the self-variables. This was derived from viewing the studies included and was not a previously tested and validated method. It was also derived with knowledge of the model of self within the psychological flexibility model. In this way it cannot be seen as a strong proof for the model. This will require observing whether it is incorporated usefully into future developments. Finally, we cannot draw very clear conclusions on the role of self-related variables in chronic pain particularly with regard to cause and effect due to the relative lack of experimental designs and the heterogeneity of studies.

Conclusion

Chronic pain can create huge impacts on the lives of those who suffer with it. These impacts can be felt deeply, including at a level of who a person experiences her or himself to be. Researchers have clearly recognized the importance of self in chronic pain and have responded by producing at least 54 empirical studies on related topics. Most of these, perhaps not surprisingly, reflect a view of self where health, well-being, and effective functioning arise mostly from positive self-evaluations and a sense of self free from threat. A smaller number of studies reflect a more unusual and somewhat counterintuitive view, that health, well-being, and effective functioning can be achieved with or without these things, if one can learn a stance toward one's experiences that is caring, kind, separate, and perhaps bigger. A challenge for those interested in self and pain, as in the general field of psychology and chronic pain, is how to organize and progress this work (McCracken & Morley, 2014). There is so far a lack of precision in the definitions of key terms and there is no unifying model of self that has cut across the many different studies to date. A reasonably simple model of self, particularly including a distinction between the content of self versus the context of self, and based on a functional contextual approach, may provide some organization and guidance.

Chapter 6 Preliminary Analyses for A Measure of Self: The Self Experiences Questionnaire (SEQ)

6.1 Chapter Overview

As discussed in chapter 5, a large volume of research has evidenced the import role of the self in people with chronic pain. However, the investigation of the self appears to be disparate, which could impede the accumulation of evidence, and set back the progress in clinical application regarding the self in relation to functioning and wellbeing. A recently discussed three-dimensional model of the self, based in the PF model, and ACT has been suggested for further investigation of the self. However, there has been few empirical investigation of this model of the self, and none in a clinical sample, partly due to the lack of measure.

This chapter aims to develop a measure of the self, based on the three-dimension model of the self, in a chronic pain sample. The study includes preliminary analyses of the reliability, validity, and potential utility of the measure.

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6.2 Publishes Article

Manuscript Number: JCBS-D-16-00008R3

Title: The Self Experiences Questionnaire (SEQ): Preliminary Analyses for a Measure of Self in People with Chronic Pain

Article Type: Research Paper

Section/Category: Empirical research

Corresponding Author: Prof. Lance M Mccracken, PhD

Corresponding Author's Institution: King's College London

Authors: Lin Yu, MRes; Sam Norton, PhD; Lance M McCracken, PhD

Abstract: Investigations of “self” in chronic pain have applied widely varied conceptualizations of the term. The purpose of the current study was to develop a measure based on the three-facet conceptualization of self rooted in the Psychological Flexibility model. Participants in this study included 528 adults referred to a pain management center who completed twenty-nine items intended as the basis for a measure called the Self Experiences Questionnaire (SEQ). Factor analyses were conducted to reduce the item pool and explore underlying dimensions. Following item and scale analyses fifteen items were selected forming a preliminary two-dimensional scale (Self as distinction, Self as observer), overall $\alpha=.90$. Adequate construct validity for the total score was supported through correlations with pain acceptance, $r=.34$, de-centering, $r=.66$, and committed action, $r=.36$, all $p<.001$. Adequate predictive validity was supported through correlations with measures of patient functioning, after controlling for pain and process from the PF model, including: depression, $\beta=.15$, $p<.01$, work and social adjustment, $\beta=.10$, $p<.05$, and pain interference, $\beta=.11$, $p<.05$. A preliminary measure of contextual elements of self with adequate reliability and validity emerged here. However, assessing self presents challenges and is complex. Refinements in this measure may be needed in the future.

Keywords: Chronic pain; psychological flexibility; self; Acceptance and Commitment Therapy

Introduction

People who struggle with chronic pain also invariably struggle with their sense of self (Toye et al., 2013). Changes in their lives, and apparent threats to physical and psychological integrity associated with chronic pain, are experienced as impacting on who they are, and perhaps who they will be in the future (Crombez, Morley, McCracken, Sensky, & Pincus, 2003). There are numerous studies of the impact of pain on “self” (e.g. Tang, Goodchild, Hester, & Salkovskis, 2010; Morley, Davies, & Barton, 2005; Compañ et al., 2011; Harris, Morley, & Barton, 2003; Pincus, Pearce, McClelland, & Turner-Stokes, 1993). In a systematic review of self-related processes in chronic pain, fifty-four studies were identified investigating various aspects of self (Yu, Norton, Harrison, & McCracken, 2015). Although the importance of self in pain is clear in this volume of research, it is also clear that the conceptualization and measurement of self-related processes in this research lack order or consistency. This is likely to confound the integration of accumulating evidence and impede a comprehensive ongoing examination of the role of self in chronic pain. A recently- discussed three-dimensional conceptualization of the self, rooted in the Psychological Flexibility (PF) model, could serve as an organizing framework (Yu et al., 2015; Foody, Barnes-Holmes, & Barnes-Holmes, 2012) and prevent these problems.

The PF model is a general model of human performance and wellbeing (Hayes, Pistorello, & Levin, 2012). Psychological flexibility is defined as the ability to be open and consciously in contact with the present moment, and to change or persist in behavior when doing so serves one's goals and values (Hayes, Luoma, Bond, Masuda, & Lillis, 2006). The PF model includes six component processes: acceptance, cognitive defusion, present-focused awareness, self as context, values, and committed action. These are sometimes summarized as “open, aware, and active” (Hayes, Villatte, Levin, & Hildebrandt, 2011). Increasing evidence supports the role of the key therapeutic processes from this model for people with chronic pain, including acceptance, present-focused awareness, cognitive defusion, values, and committed action (McCracken & Morley, 2014; McCracken & Vowles, 2014). There is also growing evidence for a treatment approach based on this model, Acceptance and Commitment Therapy (ACT) (Hayes, Strosahl, & Wilson, 1999), particularly in people with chronic pain (Hann & McCracken, 2014). However, the self-related processes in the model have not been adequately examined as appropriate measures are lacking.

From the perspective of PF and ACT, “self” in a broad sense is conceptualized along three dimensions: self as content, self as process, and self as context (Foody et al., 2012; McHugh, 2015). Simply put, self as content involves identifying the self with the content of one's psychological experiences. This is more or less a conventional sense of self in which “I” am the sum of my thoughts and feelings, including I am what my thoughts say I am. Self as process involves an ongoing awareness of one's experience such as thoughts, feelings and sensations. Self as context, somewhat more unusually, involves separation from, or de-identification with, one's psychological experiences, an experience of being bigger than or above one's thoughts and feelings. Metaphorically speaking self as context is like a perspective one can take on one's thoughts and feelings, a perspective that includes a distinction between self and these experiences, a sense of self as “container” of one's thoughts and feelings, or like a “place” where one's thoughts and feelings occur. From the point of view of PF, over-attachment to self as content can entail restricted or avoidant behavior, while self as context, facilitated by the awareness of ongoing experiences (self as process), can promote more effective and engaged patterns of behavior, with the capacity to persist or change these patterns, guided by goals and values.

The purpose of this study was to develop a measure of self-related processes based on the three-dimensional conceptualization of the self in the PF model in a sample of people with chronic pain. The study includes preliminary analyses of the reliability, validity, and potential utility of the measure. It was expected that three psychometrically adequate and theoretically consistent scores from the measure being developed would significantly and moderately correlate with other measures of PF, supporting construct validity. It was also expected that these scores would correlate significantly with measures of depression and daily functioning and do so independently from other established PF processes, as a demonstration that the dimensions of self captured in the measure have potentially unique therapeutic relevance.

Method

Sample

Participants for this study were 528 adults (65.2% women) consecutively seen in a pain management service in central London. Average age was 47.2 (SD=12.0) years old. Mean years of education was 13.6 (SD=3.9) years. Most self-described themselves as white (n=426, 80.7%), followed by black (n=44,

8.3%), Asian (n=24, 4.5%), mixed (n=16, 3.0%), and other (n=14, 2.7%). Median pain duration was 105 months (range: 12–744). Many people reported generalized pain (n=165, 31.4%). The most affected specific pain site was lower back (n=469, 88.8%), followed by lower limbs (n=423, 80.1%), neck (n=327, 61.9%), upper shoulder or upper limbs (n=322, 61.0%), pelvic region (n=264, 50.0%), head or face (n=192, 36.4%), abdominal region (n=178, 33.7%), chest (n=126, 23.9%), anal or genital region (n=91, 17.2%). About half of the participants were out of work due to pain (n=261, 49.4%), 2.1% (n=4) were out of work due to problems unrelated to pain. Only 13.8% (n=73) of the participants were employed full-time, 11.2% (n=59) part-time, and 7.8% (n=41) were homemakers, carers, or volunteers. All participants completed the items that would later form the SEQ, along with other measures, on the first day of treatment. All participants provided their permission for their data to be used in research and the database was granted ethics and Research and Development Department approval.

Measures

Self Experiences Questionnaire (SEQ)

The Self Experiences Questionnaire is the inventory being developed in the present study to measure self-related process within the PF model. The first and second author constructed 34 items based on the three-dimensional conceptualization of the self through a process of discussion and consensus. The 34 items were sent to six specialist psychologists from a pain management center for their independent ratings of clarity and theoretical consistency of each item. In addition, two experts in psychological flexibility and self-related research were consulted for their input employing the same rating dimensions and for additional comments and advice. The first and second author then refined the 34 items incorporating feedback from the clinicians and topic experts. Through this process, five items were dropped from the item pool and some re-wording of several items was done. No additional items were suggested. An item pool of 29 items was submitted for data collection. All items are rated on a 0–6 scale from “never true” to “always true”.

Chronic Pain Acceptance Questionnaire (CPAQ-8)

The Chronic Pain Acceptance Questionnaire is a 20-item scale for accessing acceptance of chronic pain (McCracken, Vowles, & Eccleston, 2004). All items are rated on a 0–6 scale from “never true” to “always true”. Higher scores indicate greater acceptance of pain. An eight-item form has been validated and was

used here (Fish, McGuire, Hogan, Morrison, & Stewart, 2010). The reliability of the eight-item scale was acceptable in the current study, $\alpha=.70$.

Experiences Questionnaire (EQ)

The EQ is a self-report measure with 20 items that assesses “decentering”, the ability to observe one's thoughts and feelings as temporary, objective events, as opposed to the reflection of the self or reality (Fresco et al., 2007). All items are rated on a 1–5 scale from “never” to “all the time”. All items are positively keyed. The decentering score is derived from 12 items and has been validated in people with chronic pain (McCracken, Gutiérrez-Martínez, & Smyth, 2014). The reliability of the 12-item scale was good in the current study, $\alpha=.87$.

Committed Action Questionnaire (CAQ)

The CAQ is a self-report measure with 20 items that assesses committed action. All items are rated on a 0–6 scale from “never true” to “always true” (McCracken, 2013). A shortened and previously validated version of eight items was used here (McCracken, Chilcot, & Norton, 2015). Four items are positively keyed, four negatively. The reliability of the eight-item scale was good in the current study, $\alpha=.83$.

Patient Health Questionnaire (PHQ-9)

The PHQ-9 is a ten-item self-report assessment for depression severity. The first nine items represent symptoms of depression and are rated on a 0–3 scale from “not at all” to “nearly every day”. The last item is rated on a scale of impact or difficulty from “not difficult at all” to “extremely difficult”. The total score of the first nine items reflects the severity of depression, with higher score reflecting higher level of severity of depression. The PHQ-9 is regarded as a reliable and valid index of depression severity (Kroenke, Spitzer, & Williams, 2001).

Work and Social Adjustment Scale (WSAS)

The WSAS is a five-item self-report measure that assesses what is referred to by the authors as “functional impairment” in terms of work, home management, social leisure, private leisure and personal or family relationships. All items are rated on a 0–8 scale, from “no impairment” to “very

severe impairment". The WSAS is regarded as a reliable and valid index of impairment in functioning attributable to an identified problem (Mundt, Marks, Shear, & Greist, 2002).

Brief Pain Inventory (BPI)

The BPI interference scale is a self-report measure of the impact of pain on daily functioning (interference) (Cleeland & Ryan, 1994). Interference from pain is rated for general activity, mood, walking ability, normal work, relations with other people, sleep, and enjoyment of life, with one item for each domain. All items of the interference scale are rated on a 0–10 scale from "does not interfere" to "completely interferes". The BPI interference scale is regarded as a reliable and valid index of pain-related interference with daily functioning (Cleeland & Ryan, 1994).

Statistical analysis

Instead of traditional exploratory factor analysis, exploratory item factor analyses (IFA) (Wirth & Edwards, 2007) based on the polychoric correlation matrix was conducted to examine construct validity using FACTOR version 10.3.01 (Lorenzo-Seva & Ferrando, 2006) including an unweighted least squares estimator. Models and estimation methods for continuous (i.e., interval or ratio scale) data are not appropriate for item-level data that are categorical in nature. The common linear factor model assumes that the outcomes are continuous, follow a multivariate normal distribution, and that a linear relationship exists between the observed and latent variables. The assumption of multivariate normality is easily violated with item level categorical data. Item factor analysis (IFA) offers an appropriate alternative to the common linear factor model when modeling categorical item-responses as polychoric rather than Pearson correlations are used (Mislevy, 1986).

Since IFA is essentially a re-parametrization of an item response model (Item Response Theory; IRT) - specifically a multi-dimensional normal ogive model (Reckase, 1985) - the results were also expressed using item response difficulty and discrimination parameters. A basic concept of IRT is that the relation between persons' latent trait levels and their probability of endorsing a given item in a trait-consistent manner is expressed by a response curve with certain characteristics, the item information curve (Edelen & Reeve, 2007). The item difficulty parameter (d) represents the points on the scale of latent trait, at which the probability of endorsing one category is equal to the probability of endorsing the next

category. This can also be interpreted as the point where, on the latent trait continuum, the category response of one category becomes relatively more likely than the previous category. The item discrimination parameter (a) or “slope” re-presents the item's ability to differentiate between people at a continuous level of the latent trait. Related to the factor loading, it describes how sensitive the item is to the change of level of the latent trait. It indicates the item discrimination in each dimension when a multi-dimensional model is applied.

The initial item pool of 29 items was submitted to preliminary analyses using SPSS version 21. All items were coded in the direction that higher scores reflect a higher level of psychological flexibility (here items reflecting defense of or entanglement with self as content were reversed). Item response frequencies were examined to identify items with skewed response distributions. Then, inter-item correlations were examined to identify items that did not correlate adequately with other items of the item pool. Following the preliminary analysis, retained items were submitted to IFA. Parallel analysis (PA) was conducted to determine the number of factors to retain (Horn, 1965). Factor loadings retain the usual interpretation as the correlation between the item and the latent factor. Reliability of the total scale was estimated using Cronbach's α . Reliability for factors was estimated based on Mislevy and Bock's statistic (Bock & Mislevy, 1982), reflecting the proportion of variance in a group of items' factor score accounted for by the underlying common latent variable. Correlations with measures of other processes of the PF model, including pain acceptance (CPAQ-8), decentering (EQ), and committed action (CAQ-8) were conducted to demonstrate construct validity. Correlations with measures of functioning including depression (PHQ-9), functional impairment (WSAS), and interference (BPI), were conducted to demonstrate predictive validity. A series of hierarchical regressions were conducted to examine the unique role of SEQ in relation to functioning including depression, functional impairment, and pain interference. Missing data were deleted listwise in correlation and regression analyses. Only cases with full data for SEQ ($n=582$) were included in item factor analysis.

Results

Preliminary analyses

Histograms and Q-Q plots for each of the 29 items from the SEQ were examined. All variables were considered approximately normally distributed with no indication of bi-modality. Further-more, all items

produced responses across the full rating scale from 0 to 6, with a median of 2–4. FACTOR 10.3.01 does not allow missing data. Therefore only participants with complete data for SEQ (83.8%) were included. Scatter plots for all variable pairs involved in correlation analyses were examined with no clear non-linear relations found. The inter-item polychoric correlation matrix for the complete cases was examined (available from the second author). A set of five items (item 3, 13, 16, 24, 25) correlated with most other items in the unexpected direction. As all items were scored in the same direction, with the intent that higher scores reflected higher psychological flexibility, this set of items was excluded from item factor analysis.

Item factor analysis

To investigate dimensionality of the item set the remaining twenty-four items relating to self were initially submitted to item factor analysis with oblique rotation, and parallel analysis. The result from parallel analysis suggested a two-dimension solution. The item set primarily loaded onto factor 1 (item 2, 4, 5, 6, 7, 9, 11) appeared to reflect separation or distinction from one's thoughts and feelings or from the conceptualized self (e.g. Although I can get caught up with my own thoughts, emotions, and sensations, I can also separate myself from them.), therefore this dimension was labeled “Self as distinction”. The item set primarily loaded onto factor 2 (item 15, 19, 21, 23, 26, 27, 28, 29) appeared to reflect a sense of self as observer of one's psychological experiences, or a “perspective-taking” sense of self, therefore this dimension was labeled as “Self as observer” (e.g. Above all my experiences, there is a sense of my self who is noticing them). Item 14 showed high cross-loading on factor 1 and factor 2, therefore it is excluded from further analysis.

Further IFA was conducted with the remaining twenty-three items (excluding item 14), with oblique rotation and parallel analysis. A two-factor solution achieving 50.2% explained variance emerged. The factor labeled “Self as distinction”, accounted for 30.3% of variance, and “Self as observer”, accounted for 19.9% of variance. The two factors achieved good reliability, .88, .87 respectively. Table 1 shows factor loadings, discrimination patterns, and category intercepts for the twenty items. Category intercepts for the items included in exploratory factor analysis were examined. The parameters were generally spread along the trait continuum. The intercepts between each two response categories

varied, indicating some items are more difficult in the lower end on the trait continuum, and some items are more difficult in the middle or higher end on the trait continuum.

Table 1 Factor loadings with oblique rotation, discrimination pattern (slope parameters), and category intercepts for the twenty items from SEQ.

Item	Factor loadings		Discrimination		Item difficulty					
	F1	F2	a 1	a 2	d 1	d 2	d 3	d 4	d 5	d 6
2	.59		.83	.19	2.41	1.55	.80	.56	1.26	2.15
4	.65		.95	.10	2.24	1.27	.45	.77	1.56	2.28
5	.73		1.21	.00	2.63	1.53	.45	.85	1.70	2.45
6	.76		1.12	.06	2.33	1.64	.88	.40	1.20	1.94
7	.68		1.02	.20	2.29	1.46	.89	.60	1.46	2.10
9	.66		.89	.08	1.79	1.08	.54	.40	1.09	1.66
11	.63		.81	.06	1.82	1.26	.69	.37	1.08	1.74
15	.31	.41	.41	.55	2.09	1.57	.94	.18	.77	1.31
19		.46	.37	.60	2.02	1.29	.64	.34	.92	1.67
21	.35	.45	.49	.62	2.24	1.53	.81	.50	1.28	1.92
23		.48	.33	.65	1.93	1.38	1.00	.31	1.10	1.77
26		.61	.03	.79	2.15	1.58	1.10	.17	.58	1.26
27		.80	.01	1.34	2.56	2.01	1.35	.12	1.05	1.94
28		.76	.06	1.25	2.93	2.27	1.61	.02	.88	1.83
29		.65	.21	.96	2.53	2.02	1.39	.25	.51	1.32

F=factor; a =item discrimination in each factor, this indicates the ability or sensitivity of the item in differentiating people at level of the latent trait (underlying the dimension). D=item difficulty (d1 represents the point, on the continuum of the latent trait, at which the probability of (participants) endorsing “0” is equal to the probability of endorsing “1”, d2 represents the point at which the probability of endorsing “1” is equal to the probability of endorsing “2”, and so forth). For instance, item 5 was the most differentiating at level of the latent trait underlying dimension1 (a1=1.21). The level of the latent trait needs to increase by 1.1 unit (d2–d1) for it to be more likely that participants endorse “1” rather than “0”, while for item 2 the level of the latent trait needs to increase by .86 unit (d2–d1) for it to be more likely that participants endorse “2” rather than “1”. This indicates that item 5 is more difficult than item 2 at the lower end of the latent trait continuum.

The fifteen items that reflected two dimensions of self were selected to form the preliminary scale, which essentially reflects a flexible or contextual sense of self. These dimensions do not precisely reflect the original three-dimension conceptualization of the self, but clearly fit one of these dimensions, self as context or the “contextual self” (CS). We therefore labelled the fifteen items accordingly as measure of CS. The two factors correlated moderately (.50). The fifteen-item scale demonstrated good reliability, $\alpha=.90$. Table 2 shows the twenty-nine items from the original item pool, with the fifteen items from the final version of the SEQ marked.

Table 2 Complete item pool of the Self Experiences Questionnaire.

	1	My thoughts and feelings overwhelm me
*	2	Although I can get caught up with my own thoughts, emotions and sensations, I can also separate myself from them
	3	I am sensitive to changes in my feelings or emotions
*	4	I am able to step back from my emotions and observe them from a separate point of view
*	5	I am able to separate myself from my thoughts and feelings
*	6	I have thoughts and feelings but am not defined as just my thoughts and feelings
*	7	I can experience a distinction between my experiences and the “I” who notices these experiences
	8	My life has changed and I no longer know who I am
*	9	I can actually see that I am not my thoughts
	10	I can have a feeling and not know what it is
*	11	I experience my self as more than my thoughts and feelings
	12	I find myself dwelling on who I used to be with a sense of loss
	13	I am who I think I am
	14	When my awareness of the present moment is lost I can return to it
*	15	The health, appearance, and feelings of my body change, but the sense of my self who is aware of these changes is the same
	16	I have certain traits and qualities as a person, and these are the real me
	17	I find myself defending who I am and cannot let it go
	18	I feel empty as a person and distressed by this
*	19	When I feel distressed I can notice what is happening without being overwhelmed
	20	I have the experience that important parts of who I am have been lost
*	21	I can notice what I am thinking and feeling without getting too caught up in these experiences
	22	I feel out of touch with myself
*	23	Above all my experiences, there is a sense of my self who is noticing them
	24	It is important that my thoughts about myself reflect who I really am
	25	It is important that my thoughts about myself are positive
*	26	I can notice that my mind is thinking from moment to moment
*	27	I can observe experiences in my body and mind as events that come and go
*	28	I am able to remain aware of my experiences from moment to moment
*	29	My roles change depending on time, place and setting, but the sense of my self who has the roles stays the same

* The fifteen items from the final version of the SEQ. Item2,4,5,6,7,9,11 loaded onto factor1 (F1, as shown in Table1). Item15,19,21,23,26,27,28,29 loaded onto factor2(F2,as show in Table2).

Validity

Correlation analyses

Preliminary correlations were conducted including the summary score from the fifteen items from the SEQ as a measure of CS and participants' background information. The score of CS was significantly correlated with age, $r=.21$, $p<.001$, but not years of education, $r=.04$. It significantly correlated with pain duration, $r=.13$, $p<.01$, and current pain intensity, $r=.12$, $p<.01$, but not pain intensity in the past week, $r=.08$.

A series of correlation analyses were performed for the summary scores of CS to explore its construct validity and its relations to daily functioning. Table 3 shows the correlations between the summary score of the selected fifteen item scale (CS), as well as the subtotal scores of the dimensions of SEQ, and other measures of psychological flexibility, and measures of functioning.

Table 3 Correlations between subtotal scores from the two factors of and the total score from the fifteen item SEQ with measures of psychological flexibility and daily functioning.

	Pain acceptance (CPAQ-8)	Decentering (EQ)	Committed action (CAQ-8)	Depression (PHQ-9)	Work and social adjustment (WSAS)	Pain interference (BPI)
Self-as- distinction	.36***	.64***	.35***	-.26***	-.14**	-.17***
Self-as- observer	.25***	.56***	.31***	-.11*	-.09*	-.06
Contextual self (SEQ total)	.34***	.66***	.36***	-.20***	-.13**	-.13**

Note. * $p<.05$, ** $p<.01$, *** $p<.001$

The CS summary score of the SEQ was significantly correlated with all three measures of PF, with a range from $|r| = .34$ to $|r| = .66$, in the expected directions. This summary score of the SEQ was also significantly correlated with depression, work and social adjustment, and pain interference.

Scores from the two separate factors were significantly correlated with the measures of PF. Self as distinction significantly correlated with all three measures of functioning. The Self as observer significantly correlated with depression and work and social adjustment but not pain interference.

Regression

A series of multiple regression analyses were conducted to examine the potential unique role of CS, along with other processes within the PF model, in relation to functioning. The total score of PHQ-9, WSAS, and the mean score of BPI interference scale were chosen in the models as dependent variables. Three models were examined separately for each dependent variable, the first model including pain and the CS total from the SEQ as predictors, the second model including pain, acceptance of pain, and CS as predictors, and the last model including pain, committed action, and CS as predictors. The multiple regressions were done hierarchically, in that participants' demographic variables, including age, gender, ethnic group, years of education, and duration of pain were entered in the first block, and then pain and acceptance of pain or committed action were entered in the second block, and CS was entered last in each model.

None of the demographic variables contributed significantly to the variance explained in any of the models, thus they were not reported here. Table 4 shows the results from regression analyses.

Table 4 Hierarchical regression analyses for depression, work and social adjustment, and pain interference

Block	Predictor	Adjusted R ²	ΔR^2	β
Depression (PHQ-9)				
1	Pain (0-10)	.13***	.11***	.36***
2	Contextual self	.18***	.05***	-.23**
1	Pain (0-10)	.13***	.11***	.32***
2	Pain acceptance (CPAQ-8)	.23***	.10***	-.29***
3	Contextual self	.25**	.02**	-.15**

1	Pain (0-10)	.13***	.11***	.32***
2	Committed action (CAQ-8)	.32***	.19***	-.41***
3	Contextual self	.33	.01	-.08
Work and social adjustment (WSAS)				
1	Pain (0-10)	.11***	.11***	.36***
2	Contextual self	.14***	.03***	-.17***
1	Pain (0-10)	.11***	.11***	.30***
2	Pain acceptance (CPAQ-8)	.25***	.14***	-.37***
3	Contextual self	.25	.00	-.05
1	Pain (0-10)	.11***	.11***	.34***
2	Committed action (CAQ-8)	.16***	.05***	-.19***
3	Contextual self	.17*	.01*	-.10*
Pain interference (BPI)				
1	Pain (0-10)	.25***	.22***	.49***
2	Contextual self	.27***	.02***	-.15**
1	Pain (0-10)	.25***	.22***	.44***
2	Pain acceptance (CPAQ-8)	.35***	.10***	-.32***
3	Contextual self	.35	.00	-.06
1	Pain (0-10)	.25***	.22***	.48***
2	Committed action (CAQ-8)	.27***	.03***	-.13***
3	Contextual self	.28*	.01*	-.11*

None of the demographic variables contributed significantly to the variance explained in any of the models, thus they were not shown in the table. The numbers of blocks indicate relative order of the shown blocks in hierarchical regression models. For each outcome measure, SEQ was first examined in the model including pain and SEQ as predictors, and then in the model including pain, CPAQ-8, and SEQ as predictors, and at last in the model including pain, CAQ-8, and SEQ as predictors.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

CS added significantly explained variance in all three models controlling for pain, 5% in the model for depression, 3% work and social adjustment, and 2% pain interference. Out of the three models controlling for pain and pain acceptance, CS contributed significantly explained variance in the model for depression, 2%, but not in the model for work and social adjustment or pain interference. Out of the three models controlling for pain and committed action, CS contributed significantly explained variance in the models for work and social adjustment, 1%, and pain interference, 1%, but not depression.

Discussion

The current study examines “self” as based on the PF model in the context of chronic pain. The aim of the study was to develop a preliminary measure of self-related processes. The Self Experiences Questionnaire (SEQ) that emerged here appears to yield reliable data that provide the basis for valid inferences related to “self as context” elements of self, with perhaps a few caveats. Each of the dimensions identified and a composite dimension (CS) made up of the two dimensions demonstrated sufficient internal consistency. The content validity of the SEQ is supported by the development process that included consensus decision making from two authors and input from experts in both the theoretical and clinical domains. Construct validity was supported by statistical analyses that showed significant moderate correlations between the SEQ scores and measures of other processes of psychological flexibility, and with measures of functioning. In regression analyses, CS showed a unique role in accounting for variance in functioning independent from pain and other measures of psychological flexibility; however, the variance it accounted for was small.

On the positive side, the SEQ appears to be a potentially sound measure of CS, and this process appears to relate to important aspects of the functioning of people with chronic pain. On the negative side, we failed to develop a measure that reflects the planned three dimensions of self that emerge within the PF model. We also did not show a strong unique role of the CS score from SEQ in functioning independent from other processes of PF.

The SEQ is a preliminary measure of self within the PF model. Among studies of chronic pain, there have been some investigating processes consistent with this contextual sense of self, such as self-compassion (Costa, & Pinto-Gouveia, 2011, Vowles, Sowden, & Ashworth, 2014), and decentering (McCracken et al., 2014). However, none of these has been specifically focused directly on self from the PF perspective as done here. The measure being developed here is an initial attempt to address this gap.

We failed to capture the dimension of self as ongoing process. Among the twenty-four items initially submitted to exploratory factor analysis, only four (item 10, 14, 22, 28) were based on self as process. Therefore, the failure in capturing this dimension may be due to the lack of items constructed for this dimension. Another reason for the failure in reflecting the theoretical dimensions may be that the three

senses of self in the initial conceptualization are highly correlated and interactive processes. In such circumstances conventional item analyses may encounter problems in distinguishing them into relatively unique and correlated sets. In fact, one item with an emphasis on Self as process (item 28) primarily loaded onto the Self as observer dimension, suggesting this inter-correlated nature in the dimensions of the self model. It is worth noting that the three-dimensional conceptualization of the self is a non-technical (so called “mid-level”) concept of the self that is applied in PF and ACT, and precise empirical validation of the model remains to be done.

Potential explanations aside, results from our data do not support the three-dimension model of the self. While it could be practically useful to have tools that capture the impacts of current methods applied within ACT, it appears premature to make definitive distinctions among the dimensions of self commonly made in PF as if they are empirically supported or even theoretically necessary. Future work pursuing the three dimensions could include refining the item pool employed here to achieve a more balanced number of items in each dimension. We suggest that future research ought to continue to refine and test the three-dimension conceptualization of the self using confirmatory factor analysis and, at the same time, remain open to the possibility of a more useful conceptualization.

Although a factor structure that reflects the original planned three-dimensional framework failed to emerge, the qualities in the factors that emerged are conceptually consistent with the content and context dimensions of self in PF and ACT. We note that there has been empirical evidence supporting separate “distinction” versus “hierarchical” deictic relations between the self and one’s psychological content (Foody, Barnes-Holmes, & Barnes-Holmes, 2013). These relations entail contrasting notions, “you are distinct from your thoughts” versus “you are the context in which your thoughts appear,” relations that may underlie the conceptualization of self in PF (Foody, et al., 2013). The content of CS (Self as distinction and Self as observer) developed in the current study has clearly captured qualities of the distinction (e.g. I am able to separate myself from my thoughts and feelings) as well as hierarchical (e.g. Above all my experiences, there is a sense of my self who is noticing them) deictic relations relevant to self, perspective-taking, and the content of one’s psychological experiences.

The senses of self we measure here are somewhat counter-intuitive. They do not easily emerge from an ordinary language environment, from the ways we see the world and speak about it in everyday life; therefore these dimensions of self might be particularly difficult for participants to report. Although the factors did not reflect the proposed three-part model, they performed in the expected direction in relation to measures of psychological flexibility and functioning. Again, as these are preliminary analyses of the measure, this is a first attempt to reflect these in a measure, as far as we know, and as the identified factors all fit within a conceptualization of CS, it would appear that these results are a useful step.

The measure showed the unique role of CS independent from pain acceptance or committed action in predicting functioning. Practically speaking, however, the percentages of variance accounted for were very small. While this is not ideal it is perhaps not entirely unexpected, as the processes within the PF are theoretically defined as overlapping. Therefore, partitioning out the shared variance of CS with pain acceptance or committed action apparently limited the ability of the CS variable to emerge as a significant predictor. We also controlled for covariates and gave better-established measures of PF processes a statistical advantage by testing these measures in the first step of hierarchical regression models – this represents a conservative way to test the role of CS.

Future studies may reinvestigate the uniqueness of the PF facets as we conceive them now and perhaps seek solutions that achieve related and independent measurements. Perhaps experimental investigation of self experiences and other PF processes that include specific manipulations represent a potential strategy to tease out the independent role of these processes in relation to functioning. Mediation analysis with longitudinal data in trials of ACT may be another means. If unique facets as we now call them are unattainable in data, perhaps adjustment of the underlying conceptual framework may be needed, perhaps there is a more useful way to talk about and organize treatment delivery and clinical research.

As a preliminary exploration of new psychological processes, the current study is limited. First, all participants are referrals to one multidisciplinary pain management center in central London. The results from this sample may not be generalized to people with chronic pain who are not referred to a

pain management center, or chronic pain population in other geographical locations or other cultures. The SEQ needs to be further tested and validated in other samples. Second, the current study is not an experimental study or randomized control trial, therefore causal relationship cannot be drawn between self as assessed here and daily functioning. Further study with experimental manipulations and longitudinal designs is needed. Third, as noted, the relations of CS with daily functioning, independent from other processes of PF were very small. In addition to the inter-correlated nature in the PF processes, this could also be due to a limitation in the instrument. As we say, this contextual sense of self is subtle, difficult to detect and describe, and therefore a great challenge for assessment with a self-report instrument. Perhaps training is required to accurately report this aspect. Again, further study with longitudinal designs, including change of this sense of self over time, and incorporating in these analyses the effect of training on the assessment process itself is need.

In summary, the SEQ appears to be yield adequately reliable and valid data with respect to contextual self, albeit with some limitations. Further study may one day lead to refinements in the assessment of self and possibly in the ways that we conceptualize psychological flexibility. With the SEQ further investigation of the role of self-related variables in treatment for chronic pain now appears feasible and is recommended.

Chapter 7 Investigation of the Association between Change in “Self-as-Context” and Improvement in Functioning in People with Chronic pain

7.1 Chapter Overview

As discussed in chapter 2, there has been accumulating evidence in support of the effectiveness of ACT in chronic pain. The effectiveness of ACT for chronic pain can be improved. One way to do this is to examine the treatment processes underlying ACT, tease out the active ingredients, and enhance these treatment processes in treatment development and delivery. Most processes within the PF model have been examined in chronic pain, including acceptance, present-focused awareness, cognitive defusion, values, and committed action in both preliminary retrospective studies and in prospective treatment outcome studies. However, self-as-text has not been investigated in its entirety as it is considered within the PF model.

This chapter aims to investigate whether ACT is associated with an effect on SAC as expected and whether this effect is positively associated with outcomes in treatment processes analyses of ACT, in people with chronic pain.

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7.2 Published Article

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Title: Change in “Self-as-Context” (“Perspective-taking”) Occurs in Acceptance and Commitment Therapy for People with Chronic Pain and is Associated with Improved Functioning

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Abstract: Acceptance and Commitment Therapy (ACT) is based on the Psychological Flexibility (PF) model, which includes a therapeutic process referred to as “self-as-context” (SAC). This study investigates whether ACT is associated with an effect on SAC and whether this effect is linked to treatment outcomes in people with chronic pain. 412 adults referred to a pain management center participated in the study. Participants completed measures of treatment processes (SAC, pain acceptance) and outcomes (pain-related interference, work and social adjustment, depression) before treatment, upon completion of treatment, and at nine-month follow-up. Paired sample t-tests and analyses of meaningful change were conducted to examine changes in processes and outcomes. Regression analyses with residualized change scores from process and outcome variables, and bivariate growth curve modeling were used to examine the association between change in SAC and change in outcomes. Participants significantly improved on all process and outcome variables at post-treatment ($d=.38$ to $.98$) and nine-month follow-up ($d=.24$ to $.75$). 42.0% to 67.5% participants showed meaningful improvements on each outcome at post-treatment and follow-up. Change in SAC was associated with change in outcomes ($\beta=-.21$ to $-.31$; $r=-.16$ to $-.46$). Results support a role for change in SAC in treatment as the PF model suggested.

Keywords: Chronic pain; psychological flexibility; self-as-context; perspective-taking; Acceptance and Commitment Therapy

Acceptance and Commitment Therapy (ACT) is regarded as a “third-wave” cognitive behavioral therapy (CBT) (Hayes, Strosahl & Wilson, 2012). ACT is distinguished by its primary focus on Psychological Flexibility (PF) (Hayes, Pistorello, & Levin, 2012). PF is defined as the capacity to be directly, consciously, and fully in contact with the present moment without needless defense, and to persist or change one’s behaviors in the service of one’s goals. The PF model is a model of general functioning and well-being that includes six interrelated core processes: acceptance, cognitive defusion, being present, self-as-context (SAC), values, and committed action. These are sometimes summarized as “open, aware, and active” (Hayes, Villatte, Levin, & Hildebrandt, 2011). Simply put, acceptance is goal-direct engagement without impractical resistance to unwanted experiences. Cognitive defusion involves contacting one’s thoughts in a way that can reduce their influence on our behavior. Being present involves being directly aware of ongoing events. SAC entails an experience of taking a perspective from which to observe one’s psychological experiences, a sense of separation from or containing one’s psychological experiences. Values are the qualities we want reflected in our behavior, what we want to achieve and how we want to achieve it. Committed action is the ability to flexibly persist in actions guided by goals and values.

Accumulating evidence supports the effectiveness of ACT in chronic pain. In a systematic review of RCTs of ACT for adults with chronic pain, ten trials were identified, and small to large effect sizes were found on various measures of physical and psychological functioning favoring ACT (Hann & McCracken, 2014). At the same time the effectiveness of ACT for chronic pain can be improved. One way to do this is to examine the treatment processes underlying ACT, tease out the active ingredients, and enhance these treatment processes in treatment development and delivery.

Most processes within the PF model have been examined in chronic pain, including acceptance, present-focused awareness, cognitive defusion, values, and committed action in both preliminary retrospective studies and in prospective treatment outcome studies (McCracken & Morley, 2014; McCracken & Vowles, 2014; Scott, Hann, & McCracken, 2016; Trompetter, Bohlmeijer, Fox, & Schreurs, 2015; Vowles, Sowden, & Ashworth, 2014; Wicksell, Olsson, & Hayes, 2010). These studies include most recently a focus on cognitive defusion (McCracken, DaSilva, Skillicorn, & Doherty, 2014), and decentering (McCracken, Gutiérrez-

Martínez, & Smyth, 2014; McCracken, Barker, & Chilcot, 2014). Decentering is a process that reflects the ability to observe one's thoughts and feelings, in a detached manner, as temporary events in the mind, as neither necessarily true nor reflections of the self (Fresco, Segal, Buis, & Kennedy, 2007). These particular processes touch on SAC, in that they entail distancing or separation from one's psychological experiences, but they do not fully investigate SAC in its entirety as it is considered within the PF model.

Currently there are many studies of self in chronic pain. The results of these studies, however, are not well organized, and the conceptualization of the self within the PF model could remedy this (Yu, Norton, Harrison, & McCracken, 2015). One barrier to further applying this model was the lack of an appropriately designed measure, but such a measure now exists (Yu, McCracken, & Norton, 2016). In the development study for this measure it was found that the dimension it assesses reflecting SAC, or "contextual self," significantly correlated with daily functioning in people with chronic pain. It now remains to extend these findings prospectively and in relation to treatment outcome.

The aim of the study is to investigate (a) whether ACT is associated with an effect on SAC as expected and (b) whether this effect is positively associated with outcomes in treatment process analyses of ACT, in people with chronic pain. In this study we use data from a cohort of adult participants in an interdisciplinary ACT-based treatment for chronic pain from measures administered at baseline, post treatment, and at nine-month follow-up. Significant changes in SAC were predicted as well as significant associations between changes in this process and changes in key outcomes, including pain-related interference, work and social adjustment, and depression.

Methods

Sample

Participants were adults consecutively attending a specialty pain management service in central London between August 2014 and June, 2016. The total initial sample included 426 people. Of these 14 did not consent to have their data used for research, 32 did not provide data at post-treatment. Another 167 participants did not provide follow-up data. Only participants who provided baseline and follow-up data

were included in the regression analyses (n=213). All participants who provided data at baseline were included in bivariate growth curve model analysis. (n=412). Patients completed standard baseline assessment measures on the first day of treatment, the last day, and at the nine-month follow-up. They also provided their background information, including sex, age, years of education, ethnic category, pain duration, pain location, and employment status.

Among participants who provided data at baseline, 68.2% (n=281) of the participants were women. Average age was 47.15 (SD=12.34) years old. Mean years of education was 13.77 (SD=4.06) years. The majority was from a white ethnic group (n=326, 79.1%), followed by black (n=35, 8.5%), Asian (n=24, 5.8%), mixed (n=17, 4.1%), and other (n=8, 1.9%). Median pain duration was 106.0 months (range: 4-744). The most common primary pain site was back (n=363, 88.1%), followed by lower limbs (n=325, 78.9%), neck (n=263, 63.8%), upper shoulder or upper limbs (n=252, 61.2%), pelvic region (n=207, 50.2%), head, face or mouth (n=153, 37.1%), abdominal region (n=136, 33.0%), chest (n=105, 25.5%), and anal or genital region (n=68, 16.5%). About half of the participants were out of work due to (n= 208, 50.5%), followed by retired (n=58, 14.1%). 14.3% (n=59) of the participants were working full-time, and 9.5% (n=39) part-time due to pain. 8.7% (n=36) of the participants were homemakers, carers, and volunteers. Others (n=7, 1.7%) were not working due to other reasons.

Among participants who provided complete data at all time points, 70.4% (n=150) of the participants were women. Average age was 46.85 (SD=11.88) years old. Mean years of education was 14.07 (SD=4.24) years. The majority was from a white ethnic group (n=171, 80.3%), followed by black (n=19, 8.9%), mixed (n=9, 4.2%), Asian (n=7, 3.3%), and other (n=5, 2.3%). Median pain duration was 103.50 months (range: 12-552). The most common primary pain site was back (n=183, 85.9%), followed by lower limbs (n=166, 77.9%), neck (n=133, 62.4%), upper shoulder or upper limbs (n=126, 59.2%), pelvic region (n=103, 48.4%), head, face or mouth (n=76, 35.7%), abdominal region (n=70, 32.9%), chest (n=53, 24.9%), and anal or genital region (n=38, 17.8%). About half of the participants were out of work due to pain (n= 97, 45.5%), followed by retired (n=29, 13.6%). 15.0% (n=32) of the participants were working full-time, and 11.3% (n=24) part-time due to pain. 9.9% (n=21) of the participants were homemakers, carers, and volunteers. Others (n=6, 2.8%)

were not working due to other reasons. All participants whose data were used gave consent for their data to be used for research. The database was granted ethics and Research and Development Department approval.

Measures

Pain intensity

Participants rated their pain intensity on average over the past week on a standard scale from 0 (no pain) to 10 (extremely intense pain).

Self Experiences Questionnaire (SEQ)

The SEQ is a 15-item self-report measure of SAC, also called “contextual self,” within the PF model (Yu et al., 2016). Contextual self refers to a sense of self that is not based in self-evaluations, or a sense of self that is separate from and containing one’s thoughts and feelings. This is also like “perspective taking” or taking the point of view of an observer of one’s psychological experiences. Examples of the items from this new measure include “Although I can get caught up with my thoughts, emotions and sensations, I can also separate from them”; “I can experience a distinction between my experiences and the “I” who notices these experiences. All items are rated on a scale from 0, “never true”, to 6 “always true”. This measure was developed in our previous study, and reported adequate internal consistency and validity (Yu et al., 2016). The reliability of the SEQ in the current study was good, $\alpha = .90$, confirming the unidimensional structure of the SEQ. The baseline score of the SEQ significantly correlated with the baseline score of a short version of the Chronic Pain Acceptance Questionnaire (CPAQ-8), $r = .41$, $p < .001$, consistent with the PF model, and supporting the construct validity of the SEQ.

Chronic Pain Acceptance Questionnaire (CPAQ)

The CPAQ is 20-item measure of the interrelated activity engagement and willingness or openness components of pain acceptance (McCracken et al., 2004). All items are rated on a 0-6 scale from “never true” to “always true”. Higher total score indicates greater acceptance of pain. A shorter version of the CPAQ was used here, the CPAQ-8 (Fish, McGuire Hogan, Morrison, & Stewart, 2010). The reliability of the CPAQ-8 in the current study was acceptable, $\alpha = .68$. The reliability of activity engagement subscale is good,

$\alpha = .86$, while the reliability for pain willingness subscale is lower, $\alpha = .68$. The reliability of CPAQ-8 for this sample is slightly lower than previous studies. However a similar pattern has been reported in previous study. In a validation study of CPAQ-8 with multiple samples, Cronbach's alpha coefficients ranging from .69 to .86 for subscales and total scale were reported across samples, with pain willingness subscale showing lower reliability (Fish, Hogan, Morrison, Stewart, & McGuire, 2013). The relatively low reliability of CPAQ-8 may mean that correlation results here underestimate actual relations with other variables due to measurement error in CPAQ-8.

Brief Pain Inventory (BPI)

The BPI is a self-report measure of pain that includes seven items that assess pain-related interference. This interference is rated for general activity, mood, walking ability, normal work, relations with other people, sleep, and enjoyment of life. All items of the interference scale are rated on a 0-10 scale from "does not interfere" to "completely interferes". The total score forms a unidimensional scale. It has demonstrated reliability and validity (Cleeland, 1994). The reliability of the BPI in the current study was good, $\alpha = .86$.

Work and Social Adjustment Scale (WSAS)

The WSAS is a 5-item self-report measure, which assesses the impairment of functioning in terms of work, home management, social leisure, private leisure and personal or family relationships. All items are rated on a 0-8 scale from "no impairment" to "very severe impairment". The total score forms a unidimensional scale. It was reported as a reliable and valid measure of impaired functioning (Mundt et al., 2002). The reliability of the WSAS in the current study was good, $\alpha = .85$.

Patient Health Questionnaire (PHQ-9)

The PHQ-9 is a 10-item self-report scale for assessing the severity of depressive symptoms. The first nine items represent symptoms of depression and are rated on a 0-3 scale from "not at all" to "nearly every day". The tenth item, not forming part of the total score, is rated on a scale of difficulty arising from the symptoms from "not difficult at all" to "extremely difficult". The total score of the first nine items reflects the severity of depression with higher score reflecting higher severity. It is reported as a reliable and valid

measure of depression severity (Kroenke et al., 2001). The reliability of the PHQ-9 in the current study was good, $\alpha = .84$. Anyone who scores 10 or above may be considered to be screening positive for clinically significant symptoms of depression.

Treatment Program

The treatment applied principles and methods of ACT in an interdisciplinary rehabilitation setting. The aim of the treatment is to improve overall patient functioning. The standard treatment was delivered over 4 full days per week for 4 weeks. Treatment was provided in a group format with 9 to 11 participants per group, and was delivered by a team of psychologists, occupational and physical therapists, nurses, and physicians. Treatment methods, including physical exercise, skills training, and education, were designed to explicitly enhance the key processes of psychological flexibility. These, in addition to more conventional goals-focused methods, and practical skills training are integrated across the psychology, physical and occupational therapy, and educational sessions. Table 1 provides an overview of the 4-week standard residential treatment. The residential, interdisciplinary, ACT-based treatment program under study here is commissioned and paid for within the provision of the National Health Service in England.

Table 1 Overview of the standard 4-week residential treatment

Discipline	Number of Sessions	Total Session Time (hour)	methods
Psychology	22	22.5	<p>Exposure-based and experiential exercises, metaphor, mindfulness practice, cognitive defusion techniques, value-based and motivational methods.</p> <p>(1) Metaphors and experiential exercises to facilitate “creative hopelessness” (control is a problem).</p> <p>(2) Metaphors, exposure-based experiential exercises, and mindfulness practice to facilitate acceptance. That is openness to experiencing pain and unwanted feelings.</p> <p>(3) Metaphors, exposure-based experiential exercises, and mindfulness practice to foster defusion and self-as-context to facilitate awareness of the present moment, and help dealing with difficult thoughts and feelings.</p> <p>(4) Metaphors and value-based and motivational methods to help patients clarify their values and take committed actions towards their valued goals.</p>
Physiotherapy	24	25.75	<p>Physical exercises under the principle of psychological flexibility, that is to persist in, or change when needed, one’s behavior in service of one’s goals and values. For example, physiotherapists help patients take gentle steps to explore the limit of their bodies, and explore different ways of body movements through which to achieve their desired actions/goals, such as tying shoes independently or making a cup of tea on their own.</p>
Occupational therapy	16	18	<p>Value-based and motivational methods</p> <p>(1) Discussion and exercises for value clarification and goal setting</p> <p>(2) Sleep education and sleep diary</p>
Doctor talk	3	3	<p>Lecturing: Pain education</p> <p>Discussion of the workability of available treatments (Does pain control work in service of your valued-goals?)</p>
Nurse session	9	10.25	<p>(1) Lecturing: Pain medication education</p> <p>(2) Medication review</p> <p>(3) Discussion about the workability of medication use (Do medications use get you closer to you valued-goals?)</p>
Friends and	1	2.5	<p>(1) Education about chronic pain and the treatment program for visitors</p>

Family visit	(2) Discussion about the impacts of pain on interpersonal relationships and how to work together to strengthen interpersonal relationship
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Statistical analysis

Skewness, Kurtosis, Histograms, and Q-Q plots for each variable were examined for normality. Scatter plots for all variables involved in correlation analyses were examined for linearity. The total scores of all measures were considered normally distributed. No obvious non-linear relation was found. One-way ANOVAs were conducted to examine the differences between those who did and did not provide complete data at each time point, including baseline (participants who only provided baseline data, $n=32$), post-treatment (participants who provided post-treatment data but not follow-up data, $n=167$), and follow-up (participants who provided follow-up data, $n=213$) in all background variables, process variables, and outcome variables. No statistically significant difference was observed in any of these variables at any time point, except for pain acceptance, with follow-up completers ($M=23.58$, $SD=7.54$) scoring significantly higher than those who did not complete follow-up ($M=21.28$, $SD=7.90$), $t(372) = 2.86$, $p = .004$. Therefore it is considered reasonable to only include participants who provided follow-up data without creating a significant bias in the data. As the current study is early attempt to investigate SAC as measured by SEQ as a component process of the PF model a comprehensive investigation including all component processes of the PF model was deemed premature, as including all established variables within the model could obscure the role of the SEQ in the data and potentially discourage further study of the role of SAC within the PF model. A recent comprehensive examination of structure of the PF model using confirmatory factor analyses in a large chronic pain sample suggested a general factor reflecting openness explaining variance across all measures of PF (Scott, McCracken & Norton, 2015). Therefore, we included pain acceptance, a process that explicitly reflects openness in the PF model, alongside background variables, as a covariate, to investigate the relative independent role of the SAC in predicting functioning.

After these preliminary analyses, a series of paired-sample t-tests were conducted to compare baseline scores and post-treatment scores, as well as baseline scores and nine-month follow-up scores for measures of processes, including pain intensity, SEQ and CPAQ-8, and for measures of outcomes, including BPI, WSAS, and PHQ-9. Within-subject effect sizes (Cohen's d) were calculated using means at each time points divided by pooled standard deviations. Cohen's (1988) thresholds for interpreting effect sizes were adopted: $d=.20$ is considered as small effect size, $d=.50$ medium, $d=.80$ large. Clinically meaningful changes were also

examined for all outcome measures at post-treatment and 9-month follow-up. Participants whose raw change scores were greater than one half of a standard deviation from their baseline score for each outcome variable were coded as 'meaningfully improved'. Those whose scores did not improve by half a standard deviation were coded as 'not meaningfully improved', while those who worsened by greater than half of a standard deviation were coded as 'meaningfully worsened'. In a systematic review of interpretation of minimal important difference in health-related quality of life (Norman, Sloan, & Wyrwich, 2003), half a standard deviation was suggested as the threshold of meaningful change for health-related self-report measures for chronic diseases.

Standardized residualized change scores were calculated for the change from baseline to post-treatment for processes variables, and the change from baseline to nine-month follow-up for outcome variable, in order to address, to a certain extent, the sequence of process variables and outcome variables. For each variable, baseline scores were used to predict post-treatment or follow-up scores, and residualized change scores were calculated as the differences between predicted and observed scores. Next, Pearson correlations were conducted to examine the correlation between the change scores from process variables, and the change scores from all outcomes variables. Following the preliminary correlation analyses, a series of hierarchical multiple regressions with residualized change scores of process variables as independent variables and residualized change scores of outcome variables as dependent variables were conducted to examine the unique role of SAC in relation to changes in functioning.

Finally, bivariate growth curve modeling was conducted separately for scores from SEQ with each outcome to examine the association between change in SAC and changes in outcomes. All participants who provided data at baseline were included in analyses. For each model, background variables were controlled at baseline. Key parameters of bivariate growth curve model include intercept, representing individuals' average baseline level, and slope, representing individuals' average growth (change) rate. Covariance between the slope for SEQ and the slope for each outcome reflects the correlation between change in SEQ and change in each outcome over time.

Results

Preliminary analyses

Scores for SAC and pain acceptance both significantly improved from baseline to post-treatment with small ($d = .38$) and medium ($d = .73$) effect sizes respectively. The improvement maintained at nine-month follow-up again with small ($d = .24$) and medium ($d = .75$) effect sizes respectively. Pain rating also significantly reduced from baseline to post-treatment ($d=.54$), and the reduction remained at follow-up ($d=.39$). Scores for all outcome variables significantly improved from baseline to post-treatment with medium to large effect sizes ($d=.53$ to $.98$), and the improvement maintained at nine-month follow-up with medium effect sizes ($d=.62$ to $.70$). Table 2 shows the mean and standard deviation of each variable, mean and standard deviation of change score, t-test values, and effect size (d) for each pair of comparisons.

Table 2 Mean, standard deviation of each variable at baseline, post-treatment and follow-up, and t value and effect sizes for each comparison.

	<u>Baseline</u>		<u>Post-treatment</u>						<u>Follow-up</u>					
	M	SD	M	SD	M	SD	t(df)	d	M	SD	M	SD	t(df)	d
					change								change	
Pain intensity	7.70	1.68	6.79	1.67	0.91	1.64	8.06(210)	0.54	6.96	2.20	.075	2.12	5.13(210)	0.39
Contextual self (SEQ)	49.65	14.33	54.86	13.40	-5.22	13.53	-5.61(211)	0.38	52.76	14.51	-3.38	13.78	-3.52(204)	0.24
Pain acceptance (CPAQ-8)	18.12	7.37	23.58	7.54	-5.46	8.19	-9.70(211)	0.73	23.97	8.57	-5.86	8.21	-10.34(209)	0.75
Pain-related interference (BPI)	7.66	1.54	5.96	2.00	1.70	1.94	12.79(211)	0.95	6.35	2.39	1.31	2.14	8.91(212)	0.70
Work and social adjustment (WSAS)	32.03	6.22	28.23	7.95	3.80	6.80	8.13(211)	0.53	26.81	10.37	5.15	8.86	8.47(212)	0.67
Depression (PHQ)	16.85	5.62	11.50	5.29	5.35	5.74	13.57(211)	0.98	13.26	6.61	3.63	6.05	8.75(212)	0.62

Note. All $p < .001$. When Bonferroni Correction applied (critical $\alpha = .025$), all significant levels remained the same, except for that of SAC, $p = .001$.

Clinically meaningful change

At post-treatment, 42.0% to 67.5% of the participants improved to a meaningful degree on each measure of outcome, and 6.6% to 9.4% worsened to a meaningful degree. At nine-month follow-up, 46.5% to 56.3% of the participants improved on the outcomes, and 7.0% to 14.1% participants worsened. Table 3 shows percentage of participants in each category of clinically meaningful change for each outcome.

Table 3 *Clinical significance of change in outcome variables at post-treatment and follow-up.*

	Clinically meaningfully improved	Not clinically meaningfully improved	Clinically meaningfully worse	Clinically meaningfully improved	Not clinically meaningfully improved	Clinically meaningfully worse
BPI	63.2%	30.2%	6.6%	49.8%	43.2%	7.0%
WSAS	42.0%	48.6%	9.4%	46.5%	45.5%	8.0 %
PHQ	67.5%	25.9%	6.6%	56.3%	29.6%	14.1%

Correlation, regression, and bivariate growth modeling

Change in pain and pain acceptance showed correlations with change scores from all outcome variables. In particular, SAC showed small to medium correlations with change scores from all outcome variables in the expected direction, with the strongest correlation observed between SAC and depression ($r=-.30$, $p<.001$). Notably, change in SAC showed significant correlation with change in functioning (BPI, WSAS) to similar magnitude as change in pain, and larger correlation than change in pain for depression. Table 4 shows the results from Pearson correlation analyses.

Table 4 *Correlations between changes in pain and process measures at post treatment in relation to change in outcome variables at follow-up.*

	Pain-related (BPI)	interference (WSAS)	Work and social adjustment	Depression (PHQ)
Pain (0-10)	.25***	.23**		.18**
Pain acceptance (CPAQ-8)	-.18*	-.19**		-.18**
SAC (SEQ)	-.23**	-.22**		-.30***

Note. N=211. All changes calculated as residualized change scores.

*p<.05, **p<.01, ***p<.001.

Two multiple hierarchical regression models (model 1 & model 2) were examined with each outcome variables as dependent variables. None of the background variables contributed significantly to the variance explained in any of the models, thus they were not reported here. Change scores from SEQ significantly predicted change scores from all outcome variables ($\beta = -.31$ to $-.21$), after controlling for background variables and pain, and after pain acceptance was simultaneously entered into the equations ($\beta = -.27$ to $-.17$). Table 5 shows the results from regression analyses.

Table 5 *Hierarchical regression analyses of changes in SAC and acceptance at post treatment in relation to changes in pain-related interference, work and social adjustment, and depression at follow-up.*

Block	Predictor	ΔR^2	β	R^2
<i>Pain-related interference (BPI)</i>				
1	Pain (0-10)	.06**	.20**	
2	SAC (SEQ)	.04**	-.21**	.10
1	Pain (0-10)	.06**	.19*	
2	Pain acceptance (CPAQ-8)	.04*	-.01	
	SAC (SEQ)		-.17*	.10
<i>Work and social adjustment (WSAS)</i>				
1	Pain (0-10)	.06**	.20**	
2	SAC (SEQ)	.04**	-.21**	.10
1	Pain (0-10)	.06**	.18*	
2	Pain acceptance (CPAQ-8)	.05**	-.12	
	SAC (SEQ)		-.17*	.11
<i>Depression (PHQ)</i>				

1	Pain (0-10)	.04*	-.13	
2	SAC (SEQ)	.09***	-.31***	.13
1	Pain (0-10)	.04*	.12	
2	Pain acceptance (CPAQ-8)	.09***	-.09	
	SAC (SEQ)		-.27**	.13

Note: None of the background variables (age, gender, ethnic group, years of education, and duration of pain) contributed significantly to the variance explained in any of the models, thus they were not shown in the table. The numbers of blocks indicate relative order of the shown blocks in hierarchical regression models. For each outcome measure, SEQ was first examined in model 1 where SEQ was entered in the last block of the hierarchical regression model, and then in model 2 where CPAQ and SEQ were simultaneous entered into the last block of the hierarchical regression model.

. *p<.05, **p<.01, ***p<.001.

Bivariate growth curve modeling was used with scores from SEQ and each outcome respectively. The slope for SEQ significantly correlated with the slope for PHQ, $r=-.46$, $p<.001$, and marginally correlated with the slope for WSAS, $r=-.41$, $p<.05$. But the slope for SEQ did not correlate with the slope for BPI to a statistically significant extent, $r=-.16$, ns. These results indicate that change in SEQ was significantly correlated with change in depression and change in work and social adjustment over time, but not with change in pain interference. This pattern is consistent with results from regression analyses with residualized change scores in terms of relative magnitude of correlations between SEQ and outcomes.

Analyses of participants that worsened

To further explore the basis for the cases that showed a worsening in functioning, the participants who reported meaningful levels of declining functioning on any outcomes at either time point were compared with other participants on background variables and residualized change scores from process variables including pain, pain acceptance, and SAC. Results from independent sample t-tests did not show significant

baseline difference on any background variables, process variables, or pain between participants who worsened at post-treatment (n=35) and those who did not. However, unlike the majority of participants, the group that meaningfully worsened showed a reduction in SAC, $t(210) = 2.80$, $p < .01$, and a reduction in pain acceptance, $t(210) = 2.22$, $p < .05$, at post treatment. Similarly, participants who worsened at follow-up (n=52) did not differ from the others on any background variables, process variables, or pain. However, once again, the group that meaningfully worsened showed a reduction in SAC, $t(210) = 3.23$, $p < .01$, and a reduction in pain acceptance, $t(210) = 2.05$, $p < .05$, at follow-up.

Discussion

The current study preliminarily investigated (a) whether ACT is associated with an increase in self report of SAC in people with chronic pain and (b) whether this increase is linked to better outcome results in treatment processes analyses of ACT. All scores from process and outcome measures significantly improved after treatment, and all improvements maintained at nine-month follow-up. 42.0% to 67.5% participants demonstrated meaningful improvements on each outcome after treatment, and 46.5% to 56.3% at nine-month follow-up. Overall these data suggested positive medium-term benefits for the treatment. The ACT-oriented treatment was associated with both improved SAC and improved functioning. Changes in SAC were associated with changes in pain-related interference, work and social adjustment, and depression. These results are consistent with the hypothesis that “self-as-context” is positively associated with health and wellbeing.

On the positive side, this is the first longitudinal study investigating what we have called “contextual self” and is more generally called “self-as-context” or “perspective taking” in the context of ACT for chronic pain. The results resonate with a previous longitudinal study, in which the researchers observed association between self-discrimination behaviors (including elements of the self as theorized in ACT) and long-term wellbeing in a non-clinical sample (Atkins & Styles, 2016). They are also consistent with the increasing number of longitudinal and mediation studies that show that ACT for chronic pain improves patient functioning specifically through its proposed mechanisms or processes, enhanced psychological flexibility

(McCracken & Gutiérrez-Martínez, 2011; Scott, Hann, & McCracken, 2016; Trompetter, Bohlmeijer, Fox, & Schreurs, 2015; Wicksell, Olsson, & Hayes, 2010).

The ACT-oriented treatment here appeared to operate as theorized, in that the improvements in treatment processes underlying ACT showed correlations with improvements in functioning. In particular, SAC showed encouraging associations with pain-related interference, work and social adjustment, and depression. Notably, SAC showed relatively stronger association with depression, suggesting its potential impact on emotional functioning. This finding appears to be consistent with previous research. Significant associations between rumination and depression have been reported in previous studies (Just, & Alloy, 1997; McCracken, Barker, & Chilcot, 2014; Nolen-Hoeksema, & Morrow, 1993; Papageorgiou, & Wells, 2003) as have significant negative associations between decentering and depression (McCracken et al., 2014). These results appear to suggest that being entangled and consistently focused within one's thoughts can contribute to depression while being "disentangled" or "distancing" from one's thoughts may be beneficial. And this "disentangled" or "distancing" from one's thoughts (particularly self-related thoughts) is indeed a defining feature of self-as-context.

In addition, in an unplanned analysis, participants who worsened in their functioning following treatment differed from those who did not on changes in SAC from baseline to post-treatment. These participants who worsened also showed a decline in SAC, while the majority of participants improved, which also supports the proposed association between SAC and functioning.

Notably, while pain acceptance showed an improvement of relatively large effect size at post-treatment, and maintained the improvement at follow-up, the effect size for SAC was relatively small and the effect size dropped at follow-up. This may reflect the relative weakness in the methods used in treatment delivery. It is possible that some processes underlying ACT, including SAC in this case, were not sufficiently addressed. Within this treatment program, experiential exercises designed to facilitate the experience of SAC were delivered in a group-format by the psychologist, followed by experience sharing in the group, again under the guidance of the psychologist. To a certain degree this could be a challenge of group delivery situations

such as is used here, where more individually focused shaping of this process could perhaps create a greater effect, although this is speculation. The relatively small improvement in SAC could also simply be due to limitation of the measure in capturing this process. As mentioned, the SEQ is a measure of SAC that was newly developed in our previous study. Further refinement of the SEQ may be needed.

The current study naturally has its limitations. First, all participants are referrals to one multidisciplinary pain management center in central London. The result from this sample may not apply to people with chronic pain who are not referred to a pain management center, or chronic pain populations in other geographical locations or other cultures. Further studies in other locations, cultures, and populations are needed to explore treatment effectiveness and treatment mechanism of ACT. In addition, only about half of the participants completed follow-up assessment, which may have limited the generalizability of these findings. However, since attrition was unrelated to our variables of interest, the potentially biasing effect on the data may have been minimal. Second, the current study is not an experimental study or randomized control trial; therefore causal relationships cannot be drawn between SAC and functioning. In other words, we cannot be certain that the ACT-oriented treatment led to a beneficial effect on functioning, nor that these operated through improving SAC. We simply report a pattern of results that is functionally consistent with the underlying model. Further study with fully controlled experimental manipulations and mediation analyses is needed to make definitive conclusions on the treatment mechanism underlying ACT. Third, this was a preliminary investigation of SAC within ACT, the first study investigating it with longitudinal design in chronic pain as far as we are aware. Conclusions on the role of SAC need to be drawn with caution. Further studies, including further refinement of SEQ and better controlled longitudinal studies of SAC will no doubt be done.

Conclusions

In summary, self-related processes have been a longstanding interest in studies of chronic pain. This no doubt emerges from the obvious, deep, personal sense of loss, threat, and even disintegration felt by those most profoundly affected by chronic pain (Osborn & Smith, 1998; Toye et al., 2013). In the present study the delivery of an ACT-based treatment for chronic pain was associated with improved SAC and functioning,

with medium-term benefits for people with chronic pain. This is a theoretically consistent result and therefore supports a heretofore little investigated component of the PF model. SAC changes from baseline to post treatment showed significant associations with changes in functioning achieved at follow-up. Further studies with experimental design and mediation analysis within RCTs are needed to investigate the causal relations of SAC as an underlying process of ACT, and functioning.

Chapter 8 A Feasibility Study of Internet-Based Empirical Investigation of “Self-as-Context” in People with Fibromyalgia

8.1 Chapter Overview

The previous chapter investigated change in self-as-context over time within a treatment setting in people with chronic pain. In this study associations between increases in self-as-context and improvements in outcomes were observed. However, causal relations between self-as-context and outcomes could not be inferred due to the lack of experimental design. Therefore, this chapter aims to develop an online experimental protocol and test the feasibility of the protocol for the investigation of self-as-context. As reported in previous chapters, people with chronic pain appear particularly prone to report a disrupted sense of self (Toye et al., 2013). A chronic pain condition where this disruption may be experienced even more acutely is in fibromyalgia (Ashbring, 2001;), the population examined here.

8.2 Introduction

People with chronic pain report struggles with their sense of self, for example feeling “I’m no longer me” (Toye et al., 2013). Certainly the significant changes in life associated with persistent pain can lead to a sense of threat with respect to one’s identity (Crombez, Morley, McCracken, Sensky, & Pincus, 2003). The key role of “self” in functioning and wellbeing has long been documented in chronic pain research (e.g. Bengtsson et al., 2013; Costa, & Pinto-Gouveia, 2013; Goossens et al., 2010; Krol et al., 1994; Morley, Davies, & Barton, 2005; Waters, Keefe, & Strauman, 2004). In a systematic review of self-related process in chronic pain (Yu, Norton, Harrison, & McCracken, 2015), 54 self-related variables were identified associated with depression, anxiety, and other measures of psychological and physical health with a small to large effect size, and yet the review of these studies suggested that variables studied are not organized into a clear theoretical model, as noted in chapter 5.

To review key theoretical points, a three—dimension model of self has been recently suggested (Foody, Barnes-Holmes, & Barnes-Holmes, 2012; Hayes, 1995; McHugh, 2015). This model of self is rooted in the Psychological Flexibility (PF; Hayes, Pistorello, & Levin, 2012) model and Acceptance and Commitment Therapy (ACT; Hayes, Strosahl, & Wilson, 1999), a form of Contextual Cognitive Behavioural Therapy

(CCBT; McCracken, 2005). From this perspective, self is conceptualized as including self-as-content, self-as-process, and self-as-context (SAC). Again, self-as-content refers to identifying with the description and evaluation of one's thoughts and feelings (e.g., I am what my thoughts say I am). Self-as-process refers to awareness of on-going events (e.g. I can notice what I am thinking and feeling), which is also a transitional process in relation to SAC. SAC entails an experience of distinction from, or containing, one's psychological experiences, like a perspective one can access from which to observe one's psychological experiences (e.g. I can observe experiences in my body and mind as events that come and go and observe that I am observing.).

The distinction between the content and contextual senses of self, as theorized in the model presented here, has been suggested as a guide for future research. This is to investigate self from the perspective of a basic science of language, for relevance to treatment, and as this model is broadly inclusive (Yu et al., 2015). As far as we are aware there are just two published experimental studies investigating the contextual self, particularly with relation to potential therapeutic application (Foody, Barnes-Holmes, Barnes-Holmes, & Luciano, 2013; Luciano et al., 2011). While these studies support the potential therapeutic uses of SAC, neither of these included clinical samples nor pain-related stimuli. In an additional longitudinal study, benefits of self-processes, including SAC, in long-term wellbeing were demonstrated, again in a non-clinical sample (Atkins & Styles, 2016).

In a cross-sectional study of SAC in a chronic pain sample, positive association between SAC and daily functioning were observed (Yu, Norton, & McCracken, 2016), suggesting beneficial impact of SAC on functioning. So far, SAC has not been investigated in an experimental context including a clinical sample. A chronic pain condition where the self-related processes are often implicated is fibromyalgia (FM). In qualitative studies the experiences of FM were found to exert particularly identity disrupting effects (Ashbring, 2001) and in quantitative survey studies these were found to disrupt (Compañ et al., 2011) or even overwhelm a person's self-concept or sense of who they are (Morea, Friend, & Bennett, 2008).

The current feasibility study was designed to examine a set of experimental methods, training procedures, and experimental stimuli for investigating the impact of SAC in people with FM. Here training conditions include SAC compared with a conventional "positive self," defined by control over or

suppression of negative thoughts and feelings. Outcome variables include responses related to avoidance (willingness to be exposed to distress), consistent with the primary focus of the PF model. Distress-related ratings represent secondary outcomes. An online system for recruitment and for administering the study was chosen and developed as an attempt to develop an efficient method for accessing clinically relevant populations, in a way that is convenient to them and low cost. Again, the object of the current study was to determine an estimated recruitment rate for future studies, to test the feasibility of delivery and retention (feasible = > 75% study completion) and data collection (feasible = > 75% data completion).

8.3 Methods

8.3.1 Design

All participants were automatically randomized into one of the two training conditions (SAC training, control and suppression training) at the beginning of the online experiment. Data for avoidance-related response (willingness to be exposed to distress) was collected after training in a between-subject model. Data for SAC and distress-related ratings was collected for a 2x2 mixed model with time (pre-training versus post-training) as within-subject factor and training condition (SAC training, control and suppression training) as between-subject factor.

8.3.2 Participants

All participants were recruited through the Internet, including online fibromyalgia forums, online fibromyalgia (or pain) support groups, Facebook and Twitter. The Internet link for the online experiment was given in an advertisement, and participants clicked on the link to find out more and potentially participate in the study. Initially 300 people were recruited. One person did not meet the inclusion criteria and 14 people did not give consent for their data to be collected after reading detailed information about the study (See Appendix F for information sheet, Appendix G for consent sheet). There were a significant number of dropouts during the study (see Results and Figure 2). Among the 153 participants who were retained in the study, 144 (94.1%) were women, 144 (94.1%) were diagnosed with fibromyalgia, and 5.9% self-reported fibromyalgia. Mean age was 45.04 (SD=10.57) years old. All participants gave consent for their data to be used for research. The project was granted ethics approval.

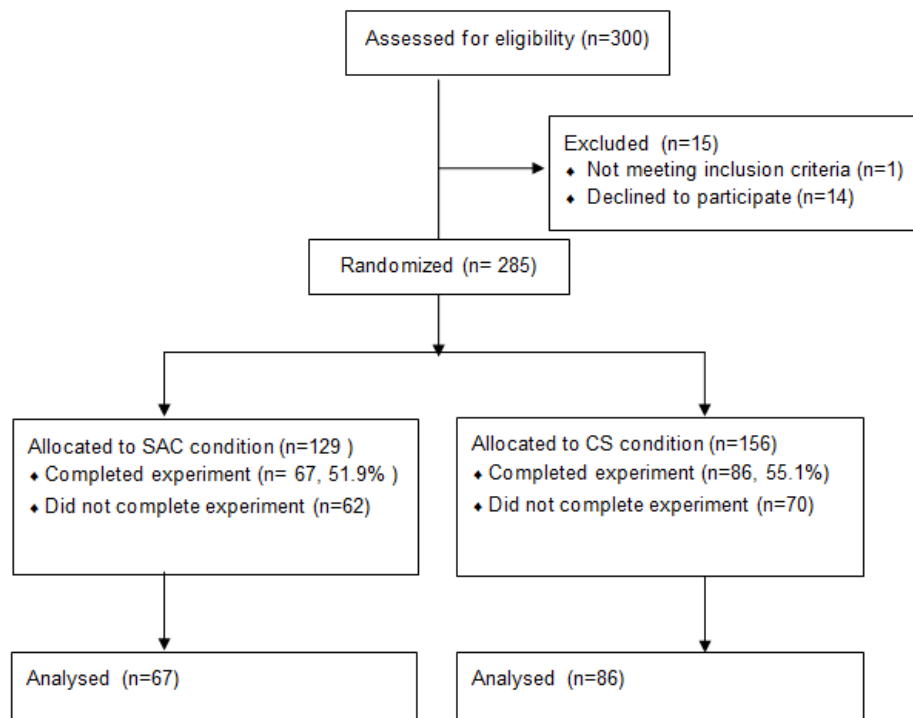


Figure 2. Flow of participants through study diagram

8.3.3 Materials

Measures

Avoidance behaviours were measured as (1) likelihood of exposure to distress-induction stimulus (2) willingness of exposure to distress. One item was used to measure likelihood of re-exposure: If you have access to this video at any time, how likely will you watch the video again and practice the technique you just learned? (On a scale from 0 “not at all” to 10 “extremely likely”.) Willingness of exposure to distress was measured as the duration of immediate re-exposure to distress-induction stimulus. This was done in two steps: first participants were required to indicate their willingness to be immediately re-exposed to distress-induction stimulus (“I am (not) willing to practice right now”), followed by re-exposure to the video, and participants were required to record the time point when they discontinued to watch the video.

Distress was measured in terms of discomfort, anxiety, and stress. One item was used to measure each dimension: How uncomfortable/ anxious/stressed are you right now on a scale from 0 “not uncomfortable/ anxious/stressed at all” to 10 “extremely uncomfortable/ anxious/stressed”?

The Self Experiences Questionnaire (SEQ) was used to measure self-as-context. SEQ is a 15-item self-report measure of “contextual self” within the PF model (Yu, McCracken, & Norton, 2016). Contextual self refers to a sense of self free from self-evaluations, like the context where these happen, or a sense of self that is separate from and containing one’s thoughts and feelings. Examples of the items from this new measure include “Although I can get caught up with my thoughts, emotions and sensations, I can also separate from them”; “I can experience a distinction between my experiences and the “I” who notices these experiences. All items are rated on a scale from 0, “never true”, to 6 “always true”. This measure was developed in a previous study, and reported adequate internal consistency and validity. The reliability of the SEQ in the current study was good, $\alpha = .90$.

Helpfulness of training was measured with one item: How helpful is the technique you just learned in dealing with your distress or unwanted thoughts and feelings on a scale from 0 “not helpful at all” to 10 “extremely helpful”. Distress level from exposure to the distress-induction stimulus was measured with one item: How distressing do you think the video is on a scale from 0 “not at all” to 10 “extremely distressing”?

Distress-inducing stimulus

A clip of a short film based on a meta-ethnography of patients’ experience of chronic musculoskeletal pain was used as distress-inducing stimulus (Toye et al., 2013). The complete video, named “Struggling to be me with chronic pain” was published and available to the public on YouTube. The film is in form of monologue from a female musculoskeletal chronic pain sufferer. Comments on the video published online showed that chronic pain sufferers’ strongly identified with and showed empathy for the role in the video. This two-minute video clip particularly focused on the struggle with one’s sense of self, associated with the experience of pain.

Training

SAC training and control and suppression (CS) training were used for each condition. Each training session was delivered through a video. The protocol of trainings comprised two parts. The first part was an awareness exercise, in which participants were guided to focus their attention on and be aware of their physical and psychological experiences at the present moment. Following awareness exercise was

training of a technique for dealing with undesirable thoughts and feelings, delivered through experiential exercises using metaphors. The SAC training used in current study is a typical exercise that has been widely used in ACT-oriented treatment to facilitate the experience of SAC. The CS training was constructed for current study, adopting the same metaphor, and experiential nature as the SAC training, with a different set of responses, that is control and suppression towards unwanted thoughts and feelings, as opposed to in SAC training where these are not resisted, or allowed to be. (Training materials are included in Appendix H.) The two training sessions were matched in content also in terms of word count of script and duration of video.

Again, SAC training was designed to facilitate the experience of SAC, as described previously here. An example of the training is: "Imagine what the sky and weather are like. Now notice, ... a sense in which you are like the sky, ... and your thoughts and feelings are like the weather. The weather changes continually, ... Notice that no matter how bad the weather is, the sky always has room for it."

CS training was designed to train participants to control and suppress undesirable thoughts and feelings as a way to retain a positive sense of self. An example of the training is: "Now notice, ...a sense in which your thoughts and feelings are like the weather, and you are standing under the sky and exposed to this weather... imagine that you get caught in bad weather. One thing you may do when this happens is to try to prevent, reduce, or not experience the negative effect that the bad weather has on you, running away from it, taking shelter, or fighting against it."

8.3.4 Procedure

The experiment was delivered through online survey package SurveyMonkey. The procedure consisted of seven stages:

Stage 1 - Screening: Potential participants were shown study information followed by self-report diagnosis (eligibility).

Stage 2 - Consent & randomization: Eligible individuals were asked for consent for their data to be used for research. Individuals who gave consent were automatically randomly assigned into SAC condition or CNS condition. Participants were unaware of their allocation.

Stage 3 - Baseline assessment: Participants were assessed with SEQ, and distress ratings.

Stage 4 - Training: Participants watched training videos. Upon completion of training, participants were assessed with SEQ again, and required to rate helpfulness of training.

Stage 5 - Distress exposure: Participants watched the distress-inducing video. They were instructed to use the technique they learned from the training to deal with undesirable thoughts and feelings that occur when watching the video. After the exposure, participants were instructed to rate how distressing they found the video, their current distress level, a rating of their likelihood for viewing the video again, and intention or willingness of immediate-re-exposure (Yes/No).

Stage 6 - Re-exposure: Participants who indicated willingness to engage in immediate re-exposure, for additional practice, were exposed to the distress-inducing stimulus again, and given the choice to put the video on pause at any time and record the pause time point.

Stage 7 – Online debriefing.

8.3.5 Analysis

The rate of subject recruitment per week was calculated, again as an estimate for planning future studies. Feasibility of delivery was evaluated based on technical success in randomization, response recording at each stage of experiment, and recording of drop-out stage. Retention rate is calculated as percentage of participants who completed experiment. Data collection rate is calculated as percentage of participants who provided complete data. Again, a 75% retention and complete data collection rate was set as the level of feasibility for the methods being tested here.

After these preliminary analyses, independent-sample t-tests were conducted to examine the difference between two conditions with regard to the avoidance-related variables. For likelihood of re-exposure to distress between-subject effect size (Cohen's d) was calculated using difference of means divided by pooled standard deviations. Cohen's (1988) thresholds for interpreting effect sizes were adopted: $d=.20$ is considered as small effect size, $d=.50$ medium, and $d=.80$ large. Subsequently it was found that most participants did not record the time point where they discontinued watching the video as instructed, so we recoded willingness of exposure to distress into a three-category variable. (Category "0, not re-exposed" represents participants who were not willing to be immediately re-exposed; category "1, partially exposed" represents participants who were willing to be re-exposed, but did not complete watching the video; category "2, fully exposed" represents participants who were willing to be re-

exposed and completed watching the video.) Therefore, chi-square test was conducted to examine the difference between two conditions in relation to this re-exposure time score. To examine the impact of the SAC training on SAC, and in reducing distress, separate mixed ANOVAs were conducted with SAC and distress ratings. Time (pre- versus post-training) was the within-subject variable, condition (SAC or CS) the between-subject factor. A condition by time interaction term was included in the model allowing for the differential effect of training on the outcome variables to be tested.

8.4 Results

300 participants were recruited within in the first week. 91.3% participants were recruited in the first week, and the rest in the second week. This recruitment result suggested that it is feasible to recruit a relatively large sample within one month.

All participants were randomised into either of the two conditions. Data for the condition to which participants were allocated was successfully recorded for all participants (Note: this is not automatically recorded in Survey Monkey and required the design of a method to capture it). Data from all participated stages was successfully recorded for all participants. The stages where participants dropped out were successfully recorded. The delivery was regarded as successful.

After screening and consent 285 out of the initial 300 people with FM began in the study. Again, these participants were automatically randomized to the SAC condition (n=129) or CS condition (n=156) without being aware of the condition to which they were assigned. Subsequently 67 (51.9%) participants completed the experiment in SAC condition, and 86 (55.1%) participants completed the experiment in CS condition. 24 participants dropped out during baseline assessment, 86 at the training conditions, another 21 during the distress exposure stage. Participants who provided complete data on the experiment (n=153; 67 in SAC condition, 86 in CS condition), 55% of those who were screened in and provided consent, were included in subsequent analyses (See figure 2 flow diagram.) Retention rate was not successful, as only 55% participants completed the study, lower than the 75%.

All participants who completed experiment provided complete data. Therefore data collection rate was 55%, as retention rate. Data collection was regarded as not successful.

Participants who completed the experiment, and were included in the analyses, and those who did not were compared on baseline demographic variables, pain, and SAC. No difference was observed in any of the variables except for pain, with non-completers ($M=7.36$, $SD=1.68$) showing higher level of pain than completers ($M=6.92$, $SD=1.58$), $t(281) = -2.30$, $p=.02$, $d=.27$. Table 5 shows baseline scores including gender, age, pain, and SAC, by condition and attrition.

Table 1 Baseline scores including gender, age, pain, and SAC, by randomization and attrition

		Total	SAC	CS
Gender	Completer	144 (94.1%)	65 (97.0%)	79 (91.9%)
N(%) women		(n=153)	(n=67)	(n=86)
	Dropout	124 (93.9%)	57 (91.1%)	67 (95.7%)
		(n=132)	(n=62)	(n=70)
	Total	268 (94%)	122 (94.6%)	146 (93.6%)
		(n=285)	(n=129)	(n=156)
Age	Completer	45.04 (10.57)	46.13 (11.09)	44.19 (10.12)
M (SD)		(n=153)	(n=67)	(n=86)
	Dropout	44.89 (11.21)	43.19 (11.15)	46.39 (11.13)
		(n=132)	(n=62)	(n=70)
	Total	44.97 (10.85)	44.72 (11.18)	45.17 (10.61)
		(n=285)	(n=129)	(n=156)
Pain	Completer	6.92 (1.58)	6.76 (1.40)	7.03 (1.70)
M (SD)		(n=153)	(n=67)	(n=86)
	Dropout	7.36 (1.68)	7.02 (1.58)	7.68(1.46)
		(n=130)	(n=62)	(n=68)
	Total	7.12 (1.64)	6.88 (1.63)	7.32 (1.62)
		(n=283)	(n=129)	(n=154)
SAC	Completer	47.73 (17.05)	50.10 (15.91)	45.87 (17.76)
M (SD)		(n=153)	(n=67)	(n=86)
	Dropout	47.68 (18.06)	47.60 (20.88)	47.73 (15.92)
		(n=108)	(n=45)	(n=63)
	Total	47.71 (17.44)	49.10 (18.02)	46.66 (16.98)
		(n=261)	(n=112)	(n=149)

The SAC training condition showed higher likelihood of re-exposure, ($M= 5.90$, $SD= 3.39$) than CS arm ($M=4.83$, $SD= 3.32$), with a small effect size ($d=.32$), but this was not a significant difference, $t(151) = 1.96$, $p=.052$.

No significant relationship was found between condition and willingness of exposure to distress, $\chi^2(2)=3.14$, $p=.208$. In SAC condition, 47.80%, 10.40%, and 41.80% of the participants scored not exposed, partially exposed, or fully exposed, respectively. In CS condition these values were 54.70%, 3.50%, and 41.90%. This indicated that compared to CS arm, SAC arm was less likely to choose not to be re-exposed to distress, and nearly three times more likely to choose to be re-exposed to distress without completing the task, but again the overall pattern here was not significantly different. Two arms were equally likely to choose to be re-exposed and completed the task.

Table 6 shows the mean and standard deviation of SAC and distress ratings at baseline and post-training, as well as the effect size of between-subject difference post-training. Mixed ANOVAs showed a significant main effect for time on discomfort, $F(1, 151)=24.33$, $p<.001$, $\eta^2=.14$; on anxiety, $F(1, 151)=26.1$, $p<.01$, $\eta^2=.06$; as well as on stress, $F(1, 151)=29.52$, $p<.001$, $\eta^2=.16$, but no interaction between time and condition on any these ratings was observed. This suggested an overall reduction in distress regardless of condition, but participants in two conditions did not significantly differ in distress reduction.

Table 2 Means and standard deviations of SAC and distress at baseline and post distress exposure in each condition, and difference between two conditions at post distress exposure

		SAC	CNS	Between-group difference
		M(SD)	M(SD)	(Cohen's d)
SAC	Pre-	50.10 (15.91)	45.83 (17.66)	
	Post-	53.78 (15.94)	48.44 (20.61)	.29
Discomfort	Pre-	6.61 (1.81)	6.64 (1.99)	
	Post-	5.64 (2.64)	5.49 (2.95)	.05
Anxiety	Pre-	5.12 (2.77)	4.77 (2.79)	
	Post-	4.52 (3.04)	4.15 (3.12)	.12
Stress	Pre-	5.46 (2.75)	5.21 (2.76)	
	Post-	4.43 (2.81)	4.26 (3.03)	.06

Mixed ANOVA also showed a main effect for time on SEQ score, $F(1, 151) = 9.54$, $p < .01$, $\eta^2 = .06$, but not an interaction between time and condition (see Figure 3.). This suggested an overall increase in SAC regardless of condition, but participants in two conditions did not differ on increase in SAC. In other words, SAC training did not appear to have a significant additional impact on SAC over CS training. An unplanned mixed ANOVA analysis including all participants with baseline data was conducted. Post-training SEQ score was imputed for people who only provided baseline SEQ score, using last observation varied forward method. That is for each individual, missing SEQ scores at post-training were replaced by the baseline scores of SEQ. A main effect of time on SEQ score was observed, $F(1, 256) = 8.78$, $p < .01$, $\eta^2 = .03$, but not an interaction between time and condition. This result is similar to the observation in people who completed the experiment.

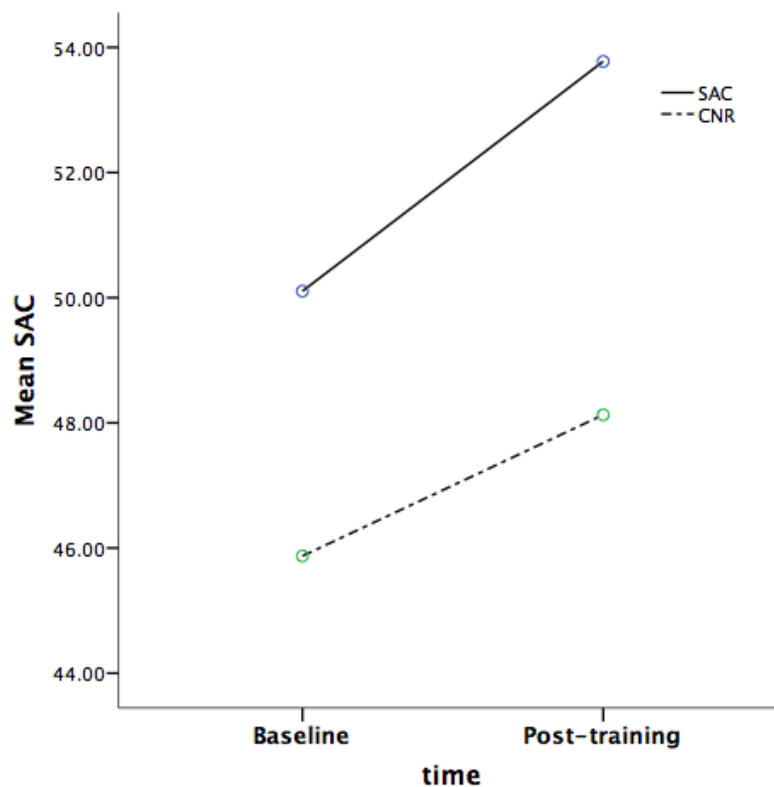


Figure 3. Mean SAC per condition with participants who completed the experiment.

The average rating of the distress level of the video across conditions was 3.85 (SD=3.11). The average rating of helpfulness of training was 4.09 (SD=2.42) for SAC condition, and 4.03 (SD=2.92) for CS condition.

8.5 Discussion

The current feasibility study examined a set of procedures and methods for an online experiment to investigate the impact of SAC training on avoidant behaviour and distress in FM. The recruitment for this study was highly successful. The technical delivery was successful as the elements of the online system operated without apparent problems. Participant retention and data collection were not successful, as study completion and data completion were below the target of 75%.

The experimental manipulation of SAC was perhaps not successful, as the SAC training did not appear to have a significant effect on reducing avoidant behaviour. There was a trend and a small effect, but the study did not include an adequately impactful and isolated effect, or enough power to detect a hypothesized effect. The SAC training also did not show superiority in reducing distress compared to CS training. Further development and testing of these training conditions will be necessary.

The attrition rate was relatively high, with 55% of participants completing the experiment. This retention appears too low as compared to other online investigations including relevant processes in a fibromyalgia sample. For instance, in a pilot study of internet-delivered ACT-based treatment reported 70% of the participants completed the treatment (Ljótsson et al., 2014). Apparently, treatments involving therapists can be more engaging than experiments without interaction. Although, we do not know if participants were lost due to losing connections with the system. By far the largest proportion of participants, $n = 86$, were lost during the training segment. This suggests either a problem during the video playing (although in previously pre-feasibility testing this never occurred) or the training content was not compelling enough to keep the participants engaged. Research has suggested the potential role of interactive web-design for enhancing users' adherence to online interventions (Ritterband, 2009). This is perhaps transferable to online experiment. For instance, interactive elements including system-generated feedback on performance of tasks, which is feasible with online experiment platform, may help improve retention. In addition, participants in the current experiment were informed that the training material was available to them on request, but were not incentivised otherwise, which could also contribute to the attrition (Abshire et al., 2017). Nevertheless, this high attrition rate could also simply indicate that this online training is not acceptable for studying and manipulating SAC.

The data did not show an effect of SAC training. This could be due to methodological weakness. First of all, the distress-inducing video was lacking strength in inducing distress. The average rating of the distress level of the video was unexpectedly low. We chose this video to specifically target the struggle with sense of self that people with chronic musculoskeletal pain experience. However, a general description of this struggle as appeared in the video did not seem to sufficiently facilitate the emergence of self-related thoughts and feelings associated with experience of pain as expected. Perhaps a closer focus on one or more specific self-related thoughts and feelings, such as asking participants to write down the most distressful self-evaluation that appear when they watching the video, may better serve the purpose. For instance, Foody and colleagues (2015) used a distress-inducing task involving participants writing and saying a negative self-referential thought, which successfully increased participants' distress level. Second, the impact of the SAC training on SAC was unsure. Indeed participants in the SAC training condition showed improvement in SAC. However, greater improvement in SAC training condition was not observed compared to the CS training. This could also be due to an insufficient delineation of the two training conditions. As both training experiences included an awareness exercise that could facilitate the experience of SAC, participants in CS condition may also slightly improve in SAC. Alternatively, it is possible that the transparency of the experiment created demand characteristics leading to participants (who completed the experiment) to rate items in the SEQ more highly during the second assessment. Or perhaps such a brief training was simply insufficient to produce an immediate effect on SAC.

The average rating of the helpfulness of training for SAC condition was low. This may also reflect a lack of intensity of training and practice. As SAC is an unusual process that does not emerge easily in an ordinary language environment, more substantial training may be needed to foster the experience of SAC, and to apply the technique when undesirable thoughts and feelings occur. Alternatively, it is possible that the measure we used (SEQ) was not suitable to measure the change of SAC over such short period. Lastly, the duration of second exposure to distress-inducing stimulus was not recorded as expected. Participants were asked to record the time point in the illustrated format, when they discontinue watching the video. This method did not operate properly. Most participants did not use the required format, which made the numbers they recorded ambiguous to interpret. Therefore, we

recoded the duration of re-exposure into a three-level categorical variable. This recoding obviously decreased the sensitivity of the measure in capturing the difference in duration of exposure.

The current study, as a pilot investigation of SAC through an internet-based experimental method, naturally has its limitations. First, participants were recruited online through social media providing few means to verify and assure the quality of responses. We did not comprehensively collect data on demographics in order to keep the survey brief. Hence, representiveness of the sample may be questionable. In addition, while the sample size here was reasonably large, the study was conducted without careful, formal, power analyses. Insufficient sample size and limited statistical power are potential interpretations of some of the null preliminary effects. Importantly, the dropout rate here is high, with most people dropped out at training stage, and we cannot track if the precise point during training that these drop-outs occurred. As the experiment was conducted through internet-based platform, and we did not have contact with participants, the reasons for such high dropout rate are unknown. In future, some type of incentives might be needed, or perhaps some system procedure to pursue dropouts and invite them to re-engage where they left off.

Due to the nature of internet-based delivery, we were not able to observe and control the performance of participants, thus we could not tell if participants participated as instructed. This could contaminate results. In order to limit dropout rate, we prioritized the brevity of procedure, and measured distress level at baseline and post-training. As such, we only recorded the change of distress from baseline to post-training, and not following training and before exposure. Last, even though we assume that participants could not detect their assigned training condition until they received it, we randomized participants before baseline assessment, and technically this could introduce bias. The lack of baseline differences argues against this. And, as an automatic system-generated procedure, selection bias seems unlikely.

In summary, we examined the feasibility of an online experimental method. Investigation of SAC with internet-based experimental methods appears feasible. Refinement of this internet-based experimental system is needed for more efficient data collection, more accurate manipulation, and stricter control, for a full experiment.

Chapter 9 Discussion

9.1 Chapter Overview

This set of projects investigates the role of the self in people with chronic pain. The investigation set out with a systematic review of the investigation of the self in chronic pain (study 1). A model of the self is suggested for future research on the self for its inclusive and generic nature, theoretical clarity, and relevance to clinical application. It was also identified that evidence from this model of the self remained lacking partly due to the lack of measure. Following the systematic review, a measure of the self or self-as-context (SEQ), based on this model of the self was developed in a chronic pain sample (study 2). Self-as-context was then investigated in relation to daily functioning using the SEQ, in the setting of an ACT-oriented multidisciplinary chronic pain management programme. Finally, a feasibility study that preliminarily investigated self-as-context, with an online experiment-design was conducted in a fibromyalgia sample.

This chapter provides a general discussion of this set of projects including these four studies. This will be done through summarizing the main findings of each study, discussing the contribution of this set of projects to the literature, and their theoretical and clinical implications, followed by a discussion of the limitations of these projects, and finally a general conclusion including suggestions for future research.

9.2 Summary of Main Findings

The aim of this PhD project is to investigate the role of self in functioning and wellbeing in people with chronic pain, with three specific objectives: (1) to systematically review the investigation of the role of self in functioning in people with chronic pain, and to examine the feasibility of applying the functional contextual model of self to the investigation of self in chronic pain; (2) to develop a measure of self based on the functional contextual model of self (self-as-context) in a chronic pain sample, so that such a measure is available for further research, particular in clinical settings; (3) to investigate the role of self-as-context in treatment aimed at improving functioning and wellbeing in people with chronic pain. Overall the aim of this PhD project was successfully addressed through four empirical studies.

In the systematic review, empirical studies investigating the relations between self and functioning in chronic pain were reviewed, and the self-related variables were successfully synthesized into two broad categories including a content-based self and a contextual self, using the functional contextual model of self as a guide, suggesting the theoretical feasibility of applying the functional contextual model of self. On the other hand, evidence from these studies was inconsistent, mostly cross-sectional, and conceptually heterogeneous, which does not allow firm conclusions on the relations between self and functioning to be drawn. This in turn supports the need for applying a theoretically comprehensive and precise model to the investigation of the self. In the measure development study, a measure of self, the Self Experiences Questionnaire, based on the functional contextual model of self was successfully developed. The SEQ demonstrated theoretically consistent dimensions, and showed good reliability and validity. This study yielded an adequate measure of the functional contextual self available for further research on the functional contextual model of self. The treatment process analysis study clearly showed a role of self in treatment aimed at improving functioning in people with chronic pain. An increase in self-as-context was observed after the ACT-oriented treatment, and the increase maintained at nine-month follow-up. In addition, the increase in self-as-context over time correlated with improvement in functioning, suggesting a beneficial role of self-as-context in functioning and wellbeing. Lastly, an online experiment was conducted to examining the feasibility of further investigating the causal relation between self and outcome variables. Although data retention was below the target for feasibility, the online recruitment and experiment delivery were successful, which suggests that it is possible in these senses to explore the causal relation between self and other variables using an online experiment. The process analysis study provided correlational evidence of the relation between self and functioning, and the online experimental study provided a protocol that is feasible as a tool for further investigating the causal relation between self and other variables.

9.2.1 Study 1: Systematic review

This first study of this thesis systematically reviewed the conceptualization, methods, and evidence from the investigation of the self in chronic pain. In this review 54 studies were identified, a mixture of correlational and experimental studies. The self-related processes identified appeared compatible with a distinction of content-based self (self-evaluation, self-description) and versus a contextual self as

conceptualized within the PF model and ACT. In general, positive self-evaluation appeared to be positively associated with functioning, while negative and inconsistent self-evaluation appeared to be negatively associated with functioning. Contextual self appeared to be positively associated with functioning. Regardless of the large volume of research, the investigation of the self appeared disparate and lacking theoretical clarity or a clear base in philosophical assumptions. This in turn could impede the accumulation and easy synthesis of evidence of the role of the self in functioning and wellbeing. In this regard, a three-dimensional model of the self, including broadly a content-based self and a contextual self, was suggested as a potential theoretical guide for future research on this topic. The PF model and ACT include clear theoretical principles, are able to generate research questions, and include available therapeutic techniques regarding the self in relation to functioning and wellbeing. Therefore this model of the self, based in the PF and ACT, could organize investigations into the role of the self, which in turn could facilitate clinical application of this model of the self.

9.2.2 Study 2: Measure development

This second study conducted as a part of this thesis included development of a measure of the self, the Self Experiences Questionnaire (SEQ), based on the three-dimensional model of the self, in a chronic pain sample. Overall the SEQ appeared to be a reliable and to yield valid inferences particular in relation to a contextual sense of self. Indeed the SEQ did not reflect all three dimensions of the model, which was against expectation and a limitation of the results. Nevertheless the SEQ captured the distinction of a content-based and a contextual self, which is a core or fundamental distinction consistent with the PF model and ACT. This project has produced, apparently, the first published measure of self from the PF model. Nonetheless, further validation and refinement of the SEQ is needed.

9.2.3 Study 3: Treatment process analysis

This third study of this thesis investigated the role of the self-as-context as a process of change in treatment with measures of daily functioning as outcomes. The SEQ developed in study 2 was used as the process measure. In a large cohort study the ACT-orientated multidisciplinary chronic pain management programme was associated with significant improvement in self-as-context upon completion of treatment and at nine-month follow-up. The improvement of self-as-context from pre- to post-treatment were in turn associated with the improvement of daily functioning, although the size of

the correlations between changes in SEQ and changes in outcome were not large. With the SEQ, further investigation of self-related processes within the PF model now appears feasible and is recommended.

9.2.4 Study 4: Online experiment

The fourth study of this thesis was the least successful from a substantive findings point of view but was successful to a degree as a step toward developing an online experimental approach to processes like self-as-context. This feasibility study tested a set of procedures and methods for an online experiment preliminarily investigating the impact of self-as-context training on avoidance behaviour and distress in people with fibromyalgia. The recruitment for this study, conducted entirely online, was highly successful. The technical delivery also was mostly successful as the elements of the online system operated without apparent problems. Retention and data collection were perhaps only marginally successful (retention of over half of the participants but not more). The self-as-context training did not produce a significant effect on reducing avoidant behaviour, although there was a trend and a small effect. The self-as-context training also did not show superiority in reducing distress compared to control and suppression training. So as a preliminary test of the training content and the particular dependent variables included, the study was not a success. Refinement of this internet-based experimental protocol is needed for more accurate manipulation, stricter control, and more efficient data collection for a full experiment in the future.

9.3 Contribution to Literature

This project contributed novel knowledge to the literature of the self in chronic pain. The systematic review was the first review of self-related processes in chronic pain. This review summarized up-to-date empirical research on the self in chronic pain, identified obstacle that may impede the progress in this research, and suggested a recently discussed model of the self for the guidance for future research on the role of the self in functioning and wellbeing. As evidence from this theoretical model is lacking partly due to the lack of measure, study 2 developed and validated a measure of the self, based on this model of the self. With the SEQ, further empirical investigation of the self-related processes is now feasible. In fact, there has been another measure of self-as-context, the Self As Context Scale (SACS, Grid & Zettle, 2013). Similar to the SEQ, the SACS measures self-as-context as conceptualized in the PF model, and captures elements of “decentring” from one’s psychological experiences. However, while the

development of the SACS was solely based on the sub-process of the PF model, self-as-context, the SEQ was developed based on the three-dimensional contextual behavioural conceptualization of the self, which allows a more precise measurement of self as conceptualized in the PF model and ACT, as well as a comprehensive investigation of self from the broader perspective of contextual behavioural science. In addition, while the SACS was developed in a sample of undergraduate students, the SEQ was developed in people with chronic pain, a population who reported struggling with sense of self. Therefore the development of the SEQ perhaps yielded more clinically relevant results, which in turn could inform clinical effort in addressing issues of self. Indeed work on the SEQ, as well as the SACS are early and important efforts to assess the self from a CBS perspective. The availability of such measurement can potentially facilitate investigations on this topic. Study 3 investigated self-as-context in a chronic pain sample with a longitudinal design. This is the first investigation of self-as-context in a clinical sample. It is also the second study examining self-as-context in a longitudinal design. This investigation provided preliminary evidence from self-as-context as a treatment process within ACT, and evidence of the mid-term benefit of self-as-context for people with chronic pain. Study 4 tested an online experiment protocol primarily for the investigation of the effect of the self on avoidance behaviour. This feasibility study provided an experimental protocol that is feasible in most respects for a full experimental investigation of the self. Further refinements in the experiment delivery and training material in particular are needed. The preliminary data informed will allow refinements of protocol for full experiment.

9.4 Theoretical and Clinical Implications

This project investigates the self within the framework of a three-dimensional model of the self based on the PF and ACT (Foody, Barnes-Holmes, & Barnes-Holmes, 2012; Hayes, 1995; McHugh, 2015). This model of the self, including a distinction of a content-based self and self as context, appears to hold the potential to provide theoretical guidance in research of the self and empirical evidence appears to suggest the feasibility of the application of this framework (e.g. Atkins & Styles, 2016; Foody et al., 2013; Yu et al., 2016). For instance, cognitive neuroscientific investigations of the self appears to show evidence suggesting a distinction between self-related content or self-evaluation and a self that is “not intrinsically self-evaluative but rather relates any presented objects to the representing

subject”(LeGrand & Ruby, 2009, p.252). The systematic review also supports the application of this conceptualization of the self. The self-related processes identified in the review appear compatible to the framework of a content-based and a contextual self. Indeed as in the development of the SEQ, these investigations did not reflect all three dimensions of the self as the model theorized. Nevertheless a broad framework, one that is functional contextual, with the distinction between a content-based and a contextual self appears applicable.

Emerging empirical investigations on this model of the self, including the SEQ development study and the process analysis study in this thesis, suggest the positive association between the contextual sense of self and functioning and wellbeing as hypothesized from relevant theory (Atkins & Styles, 2016; Foody et al., 2013). In the process analysis study, improvement of the self-as-context appears to be associated with mid-term improvement in functioning in people with chronic pain. Atkins & Styles (2016) observed long-term association between self-as-context and wellbeing in a non-clinical sample. People with chronic pain reported struggling with “affirming the self”, and “holding onto the real me” (Toye et al., 2013). ACT, with its inclusion of this three-dimensional conceptualization of the self, can perhaps address this particular treatment need of people with chronic pain, particularly by providing another option for achieving positive wellbeing and performance, one that may be more effective or efficient to achieve for some.

This series of empirical studies on self-as-context is an early effort, essentially a first step, to investigate sense of self from a contextual behavioural perspective in chronic pain. With its focus on process in relation to outcomes, this investigation fits the broader research agenda of CBS. In CBS, practices improve outcomes through changing behavioural processes suggested by contextual principles and models (Hayes et al., 2012), which means that measurement and analysis of processes of change is key to the CBS approach. A model of the self based on mid-level terms is used in this series of investigation. Indeed, in the domain of RFT, the investigation of sense of self has achieved significant progress (e.g. Foody et al., 2013; McHugh et al., 2004), and this is essential to the investigation of sense of self with precision, scope and depth. Yet RFT investigations involve highly abstract technical terms and complex experimental paradigms, thus are limited in treatment and clinical research utility so far. The model of the self based on mid-level terms, with its relevance to a practical clinical model, the PF model, can be

readily adopted in treatment and clinical research, as in the studies discussed in this thesis. The pragmatic nature of the model and the approach of the investigation in this thesis also embrace the CBS practical approach to knowledge. In the domain of ACT and the PF, most component processes in the PF model have been largely investigated including acceptance, defusion, committed action, and values across populations (Hayes et al., 2006), but the investigation in self-as-context remains limited. The availability of an adequate measurement of self-as-context that is accessible to researchers and practitioners could facilitate this investigation. Self-based techniques and methods are used in ACT. Yet, our understanding of these techniques and methods are still at an infancy stage. The process of change study discussed in the thesis is among the first attempts to develop our knowledge on this topic, and to progress the application of these theoretical principles. A full range of research on self-as-context, including the theoretical framework, and techniques and methods targeting at this process, in clinics and laboratories are called for. Research methods, including single-case series that allow close observation of individual changes and precise experimental manipulation, as well as qualitative studies that keep research in contact with the experience of studied population, amongst other methods, are encouraged and needed. Naturally, what has been done here in this thesis will be tested, refined, and perhaps even changed when necessary. However, what is important is that a next-step is provided here.

9.5 Limitations

This project naturally has its limitations. First of all, this project investigated the self mainly using quantitative methods, in order to investigate the self in a consistent fashion. Obviously the self is a complex phenomenon that presents measurement challenges. Qualitative method could certainly compliment quantitative approach in this investigation. Second, the project did not include RCTs with formal mediation analysis or full experiment. A single treatment group design was used in the process analysis study. Although statistical techniques (residualized change scores calculated from different time points for process variables and outcome variables) were applied to address sequence for process variables and outcome variables, we cannot be certain about the mediating role of self-as-context. In other words, we cannot be certain whether the ACT-oriented treatment took effect through self-as-context as hypothesized. In study 4, an online experimental protocol was tested, and the retention was only not very successful. The self-as-context training used in the experiment did not appear to produce

significant effects on self-as-context as measured by the SEQ, and the hypothesized association between self-as-context and avoidance behaviour was not observed. The refinement of the experimental protocol is certainly needed. Thirdly, our samples are not likely to be representative of the general population. All participants in study2 and study3 were referrals to one multidisciplinary pain management centre in central London. All participants in study 4 were recruited through social media. We did not have contact with participants, and background information was not comprehensively collected due to the need to limit the effort required to complete the study. Therefore our knowledge of the representiveness of this sample is very limited.

9.6 Conclusion

This set of projects empirically investigated the role of self in functioning and wellbeing in people with chronic pain, within the framework of PF and ACT. These investigations add new knowledge to the understanding of the self in people with chronic pain. The development of SEQ and the online experiment protocol could facilitate empirical and clinical investigation of self-as-context. The treatment process analysis produced evidence for the effect of self-as-context on daily functioning as hypothesized within the PF model and ACT. These are all very early attempts to better understand the self as conceptualized within the PF model and ACT. Further validation and refinement of the SEQ in different clinical populations, across geographical locations and cultures are certainly needed. In the meantime, development of other measurement methods and techniques, perhaps measurement that are not essentially self-report, or measurement conducted in real world context such as through patient diary, are certainly needed and recommended for accurate measurement of these self-related processes. Further test, and refinement of the model if needed, is necessary. Further investigation, including RCTs with formal mediation analysis, experiments, and studies with longitudinal designs are certainly desirable to understand the role of the self in functioning and wellbeing, and can take direction from the methods used and results obtained here.

Appendix A. Search Strategy for Systematic Review

1 exp Pain/

2 ((chronic* or back or musculoskel* or intractabl* or neuropath* or phantom limb or fantom limb or neck or myofasc* or temp? romandib* joint or central or post*stroke or complex or regional or spinal cord or idiopathic or shoulder or persistent) adj4 pain*).ab,ti.

3 (sciatica or back-ache or back*ache or lumbago or fibromyalg* or (trigemin* adj2 neuralg*) or (herp* adj2 neuralg*) or (diabet* adj2 neuropath*) or (reflex adj4 dystroph*) or (sudeck* adj2 atroph*) or causalg* or whip-lash or whip*lash or polymyalg* or (failed back adj4 surg*) or (failed back adj4 syndrome*) or arthritis or cumulative trauma or irritable bowel syndrome* or pancreatitis or peripheral vascular disease or repetitive strain injury or rheumatic or angina or interstitial cystitis or vestibulodynia).ab,ti.

4 1 or 2 or 3

5 (identity or ego or (self adj3 identification) or (self adj3 evaluation) or (self adj3 definition) or (self adj3 compassion) or (self adj3 esteem) or (self adj3 worth) or (enmeshment adj3 self) or (self adj3 discrepant*) or ought self or should self or ideal self or feared self or possible self* or (perspective adj3 self) or self-as-context or (self adj3 awareness) or (concept adj3 self) or (self adj3 consciousness) or (self adj3 image) or (self adj3 perception) or (self adj3 presentation) or (self adj3 reference) or (self adj3 regard) or (self adj3 schema*) or (sense adj3 self) or (self adj3 observ*) or (self adj3 narrative) or (self adj3 know*)).mp.

6 4 and 5

Appendix B. Study Quality Assessment Tool

1. Are individuals selected to participate in the study likely to be representative of the target population?

Yes 1 No 0 Can't tell 0

- Participants would be representative if they comprised the entire source population, an unselected sample of consecutive patients, or a random sample.

2. Are individuals prepared to participate in the study likely to be representative of the target population? (Percentage of selected individuals agreed to participate)

Yes 2 Likely 1 No 0 Can't tell 0

- This question should be answered yes if at least 80% of the subject recruited agreed to participate, likely if at least 60%, no if less than 60%.

3. Are characteristics of the participants included in the study clearly described?

Yes 1 No 0

- This question should be answered yes if the age, sex and diagnosis of the participants are reported or the Inclusion and/or exclusion criteria are given

4. Is the sample size justified?

Yes 1 No 0

- This question should be answered yes if the sample size is justified in relation to a power calculation and/or the number of independent variables utilized

5. Is the hypothesis/aim/objective of the study clearly described?

Yes 1 No 0

6. Are data collection tools shown to be accurate (valid and reliable)?

Yes 2 Partially 1 No 0

- For studies where the measures are clearly described, the question should be answered as yes. For studies refer to other work or that demonstrates the measures are accurate, the question should be answered as yes. For studies where only validity is reported, the question should be answered as partially.

7. Does the statistical analysis adjust for potential clinical and psychological confounders (e.g. using regression or ANCOVA rather than just correlations or t-test)?

Yes 2 Partially 1 No 0

- Where both clinical and psychological confounders were controlled the answer should be yes. If only clinical or psychological confounders were controlled the answer should be partially. Studies where neither clinical nor psychological confounders were controlled

should be answered no.

8. Is the analysis clearly reported (i.e. summary statistics are reported and the statistical tests used are stated)?

Yes 1 No 0

9. In trials and cohort studies, do the analyses adjust for different length of follow-up of patients?

Yes 1 No 0

- Where follow-up was the same for all study patients the answer should be yes. If different lengths of follow-up were adjusted for, the answer should be yes. Studies where differences in follow-up are ignored should be answered no.

Global Rating

Good: No domain rated < 2 points

Moderate: One domain rated < 2 points

Weak: Two or more domains rated < 2 points

Appendix C. Table of Characteristics of studies

Study	Design	Participants	Self-related variables	Quality
<u>Evaluative self</u>				
Armentrout (1979) US	Comparative	Control:20M Low back pain: 19M 1F control 47.8 LBP 43.3(M) control: hospitalized patients referred for psychological evaluation LBP: patients referred to medical center pain unit for evaluation Low back pain 7.9 years	Self-concept	Weak
Thomas and Lyttle (1980) Canada	Cross-sectional	57M 38F 37(SD=11) Patients referred to an orthopedic clinic in a community hospital from GP Low back pain Not given	Self-concept	Weak
Beekman (1984) US	Cohort	Spinal pain patients: 20M 30F Controls: 6M 6F Spinal pain patients: 39.44 (SD=11.04) Controls: 48.67 (SD=13.80) Consecutive patients who entered the rehabilitation phase of the Spinal Pain Program Chronic back pain 7.72 (SD=8.43) years	Self-concept	Weak
Schimit (1984)	Comparative	Cannot tell (39 chronic pain patients, 39 healthy controls)	Self-concept	Weak

Netherlands		Chronic pain patients: 41 (SD=9) Healthy controls: 41 (SD=8)	Self-esteem	
		Patients were referred by the orthopedic clinic of the medical center		
		Chronic low back pain		
		104 (SD=85, range: 6 months to 25years) months		
Fitzpatrick et al. (1988) UK	Cross- sectional	36M 122F 55 (SD=11, range:22-70) Patients with RA attending the outpatient clinic of a teaching hospital Rheumatoid Arthritis 16 (SD=11.9) years	Self-esteem	Weak
Cornwell & Schmitt (1990) US	Comparative	Rheumatoid Arthritis subjects: 26F Systemic Lupus Erythematosus : 23F Healthy controls:28F 50.5 (range:24-79) RA subjects: women with RA enrolled from the practices of four rheumatology specialists in an outpatients clinic of a university medical centre; SLE subjects: enrolled from the practices of two allergy and immunology specialists within the same institution and from a community support group; Healthy controls: a randomized computer selection of female alumnae from the university Rheumatoid Arthritis or Systemic Lupus Erythematosus 13.5 (range: 1-47) years	Self-esteem	Weak
DeVellis et al. (1990) US	Cross- sectional	28 M 43F 55(range:19-70) Patients were recruited from lists provided by rheumatologists Rheumatoid Arthritis Not given	Self-esteem	Weak
Marbach et al.	Comparative	TMPDS patients: 18F Controls: 18F	Self-esteem	Weak

(1990)		TMPDS patients: 36.8 (SD=7.6, range 25-51) Controls: 32.8 (SD=7.9, range 22-52)		
US		Patients: recruited from a private practice Controls: obtained by asking patients to name women acquaintances from their neighborhoods		
		Chronic temporomandibular pain and dysfunction syndrome (TMPDS)		
		Cannot tell		
Christian (1992)	Cross-	23F	Self-esteem	Weak
US	sectional	18-45		
		Women with a current diagnosis of endometriosis were selected by a private gynecologist		
		Endometriosis		
		Cannot tell		
Skevington (1993)	Cohort	Stage1 patients: 30M 39F	Self-esteem	Weak
UK		45.5		
		Patients volunteered to participate		
		Rheumatoid arthritis		
		2.7 years		
Krol et al. (1994)	Cross-	104M 188F	Self-esteem	Moderate
Netherlands	sectional	53.4(SD=11.9, range:21-71)		
		Rheumatology patient files of practicing rheumatologists from six hospitals		
		Rheumatoid arthritis		
		4years(56 patients), 3years(57 patients), 2years(62), one year(56), recently(61)		
Penninx et al. (1997)	Cohort	Mild Arthritis: 237M 375F; Severe arthritis:93M 266F; Control: 414M 305F	Self-esteem	Weak
Netherlands		MA: 70.7(SD=8.1) SA:70.3(SD=8.8) Control:67.2(SD=8.6)		
		A random sample from a 10-year longitudinal study		

		Arthritis (OA/RA)		
		Not given		
Druley & Townsend (1998)	Cross-sectional	Rheumatoid Arthritis group: 37M 53F Healthy control group: 37M 53F RA group: 38.8(SD=6.7, range: 25-50) Healthy control group: 38.9 (SD=6.7, range 27-50) Data from national survey Rheumatoid Arthritis Cannot tell	Self-esteem	Weak
Krol et al.(1998)	Cohort	RA group:104M 188F; Reference group:48M 125F RA group: 53.4(SD=11.9, range:21-71) Reference group:51.4(range:20-70) RA patients: rheumatology patient files of practicing rheumatologists Reference group: general community Rheumatoid arthritis Not given	Self-esteem	Good
Sheasby et al. (2000)	Cross-sectional	Study1: 65M 116F Study2: 25M 92F Study1: Median: 21 (range18-49) Study2: median:38 (range:19-51) Health sample(study1): convenience sample of undergraduate students from two universities; Arthritis sample (Study2): unemployed adults with arthritis who participated in a controlled study evaluating a personal development program Arthritis Cannot tell	Self-esteem	Moderate
Barlow et al. (2001)	Cohort	Intervention group: 7M 30F Control group: 5M 37F Intervention group:37(range:19-50) Control group:40(range:25-51) Adults with arthritis recruited through the Arthritis Care network	Self-esteem	Moderate

		Arthritis (Intervention group: 62% rheumatoid arthritis (RA), 11%osteoarthritis (OA), 35% other; Control group: 74% RA, 14% OA, 24% other) Intervention group: 9 years (range: 0-30) Control group: 17years (range:2-40)		
Guillemin et al. (2001) France	Cohort	33M 69F 66.3(SD=6.0, minimum 50) Patients who had received at least one course of therapy at a spa were invited to participate in the study Low back pain: 19, knee osteoarthritis: 42 Hip osteoarthritis: 16 Knee and hip osteoarthritis: 24 Not given	Self-esteem	Good
Suurmeijer et al. (2001) Netherlands	Cohort	Netherlands: 96M 172F France:27M 62F Norway:56M 160F Netherlands:54.4(SD=11.8) France:53.9(SD=11.3) Norway:51.9(SD=13.1) Data of patients from a multicenter, multidisciplinary longitudinal study Rheumatoid Arthritis Netherlands:21.9months(SD=13.9) France:30.6months(SD=16.6) Norway:26.5months(SD=13.8)	Self-esteem	Moderate
MacKinnon & Miller (2003) UK	Comparative	Rheumatoid Arthritis group: 36M 107F Comparison group: 39M 103F RA group: 49.7 (SD=11.2) Comparison group: 50.1 (SD=11.96) RA group: People with RA who attending the Rheumatology Clinic at a healthy service centre; Comparison group: recruited from municipal records Rheumatoid Arthritis Cannot tell	Self-esteem	Moderate
Nagyova et al. (2005) Netherlands	Cohort	25M 135F 48.7(SD=12) Data of patients from a multicenter, multidisciplinary longitudinal study	Self-esteem	Moderate

		Rheumatoid Arthritis		
		22.2 month(SD=15.9)		
Covic et al. (2006) Australia	Cross-sectional	31M 103F 57.85 (SD=12.24, range: 29-80) Recruited from three private rheumatology clinics at the midpoint of a longitudinal study Rheumatoid Arthritis 13.07 (SD=9.49) years	Self-esteem	Moderate
Michielsen et al. (2006) Netherlands	Comparative	12M 73F Median: 60 (range: 17-24) Patients send by their primary care physician to a university hospital because of their suffering from fatigue and/or musculoskeletal complaints Chronic fatigue syndrome or chronic fatigue syndrome plus Fibromyalgia At least six month	Self-esteem	Moderate
Tang et al. (2007) UK	Comparative	CP patients:25M 69F CP Volunteers:9M 23F Pain-Free Control:31M 48F CP:47.4(SD=11.3) PFV:39.6(SD=12.4) CPV:44.8(SD=13.3) CP: outpatient pain clinic of a teaching hospital; PFV&CPV: adult passer-by on the street in multiple locations within the same catchment area of the hospital Chronic pain: 67% having back or neck pain as their predominant complaint (Minimum 6 months)	Mental defeat	Moderate
Reneman et al. (2008) Netherlands	Cross-sectional	60F 32F 38.4(SD=8.7) Male:38.1(SD=8.3) Female:38.9(SD=9.5) Patients referred for an outpatient multidisciplinary pain management program in a rehabilitation center	Self-esteem	Good

		Non-specific low back pain (minimum 3 months)		
Schiphorst Preuper et al. (2008) Netherlands	Cross- sectional	60M 32F 38.5 (SD=8.7) Consecutive patients who were referred for a multidisciplinary pain management program in the Centre of Rehabilitation of a university medical center Low back pain Median: 52 weeks (interquartile range: 24-150)	Self-esteem	Weak
Chang et al. (2009) Taiwan	Cross- sectional	10M 56F Male: 54.40(SD=16.57) Female: 50.55 (SD=11.28) Patients diagnosed with RA at the Rheumatology Department of a Medical Centre Rheumatoid Arthritis Cannot tell	Self-esteem	Weak
Bode et al. (2010) Netherlands	Cross- sectional	64M 104F 54.18(SD=14.53, range:12-84) Recruited in the waiting room of the outpatient rheumatology clinic of a hospital Rheumatic disease (Peripheral arthritis: 42.9%, Degenerative disease: 11.3% Else (fibromyalgia, sclerodermas, low back pain...:other rheumatic disease):24.4%, Do not know: 21.4%) 10.87years(SD=12.19, range:0-67)	Self-esteem Body-self unity	Good
García- Campayo et al. (2010) Spain	Cross- sectional	229F 21M 44.9 (SD=7.2, range:24-61) Consecutive patients recruited from primary settings Fibromyalgia	Mental-defeat	Moderate

		7.9 (SD=2.3, range:1-20) years		
Tang et al. (2010) UK	Cross-sectional	30M 103F 46.1(range:20-65; median=46) Patients with chronic pain seeking treatment from a pain clinic Chronic pain in lower back (71.4%), legs (51.9%), neck (41.4%), shoulder (34.6%), knee (30.1%), arms (25.6%), upper back (24.2%), joints (21.8%) 10.7 years (range:16.7- 47.1; median:26.7)	Mental defeat	Good
<u>García-Martínez et al. (2011)</u> <u>Spain</u>	RCT	28F Exercise group: 59.3(SD=4.8) Control group:58.6(SD=7.8) Recruited from a Fibromyalgia and Chronic Fatigue Association Fibromyalgia Exercise group: 9.9(SD=3.8); Control group: 10.6(SD=4.1)	Self-esteem Self-concept	Moderate
Bengtsson et al. (2013) Sweden	Comparative	IBD:40M 34F IBS:11M 70F IBD:43.2(SD=17; range:18-82) IBS:37.5(SD=12.3; range:21-66) Patients treated as the division of gastroenterology at a hospital Irritable bowel syndrome (IBS) or inflammatory bowel disease (IBD) Not given	Self-esteem	Weak
Tang et al. (2013) HK	Cross-sectional	Chronic pain (CP) patients: 24M 19F; Chronic pain volunteers: 12M 29F Chronic pain patients: 45.4(SD=10.4); Chronic pain volunteers: 41.4 (SD=11.8) Chronic pain patients: Recruited from a multi-disciplinary pain management center at a regional hospital; Chronic pain volunteers: recruited from community within the catchment area of the hospital CP patients: chronic pain (back pain 61%, shoulder and knees 23% each, neck and legs 21% each,	Mental-defeat	Moderate

feet and wrist 19%each, abdomen and head 9%each, arms 5%, joints 2%) CP volunteers: chronic pain (42% back pain)
CP patients: 51.4 (SD=55.6) months CP volunteers: 72.4 (SD=66.4) months

Descriptive self

Toner et al. (1990) Canada	Quasi- experimental	Irritable Bowel Syndrome group(IBS): 3M 18F Major Depression group(MD): 12M 9F Control group: 6M 13F IBS:39.4 MD:36.8 Control:32.7 IBS: patients that have been diagnosed at a hospital MD: outpatient psychiatric patients diagnosed at a institute of psychiatry Control: students and stuff recruited from the hospital, the institute of psychiatry and a university Irritable Bowel Syndrome or Major depression Cannot tell	Self-schema	weak
Pincus et al. (1993) UK	Experimental	Pain group: 8M 13F; Control group: 8M 13F Pain group: 43.9(SD=12.33, range:27-67) Control:50.7(SD=15.97, range:20-69) Pain group: pain patients attending a rheumatology clinic at a hospital; Control: recruited through a local community center Chronic pain condition 4.1 years (SD=9.1)	Self-schema	Weak
Pincus et al. (1995) UK	Quasi- experimental	7M 12F in each group Depressed pain group: 49.05(SD=12.03); Pain group:49.00(12.28); Controls:48.50(SD=9.92) All patients were recruited at random from rheumatology clinic; Controls were recruited through local community center and local advertisements	Self-schema	Weak

		Depressed pain group: 14 rheumatoid arthritis, 5osteoarthritis; Non-depressed pain group:15 rheumatoid arthritis, 4osteoarthritis Depressed pain patients: 13.31years(SD=14.67) Pain patients: 11.1(SD=10.11)		
Calfas et al. (1997) US	Quasi- experimental	11M 29F 67(SD=7.2) Recruited by newspaper ads, physician referrals and public service announcements Osteoarthritis Less than 1 year: 2 (5%); 1-5 years: 1 (3%); More than 5 years: 37 (93%)	Self-schema	Weak
Harris et al. (2003) UK	Cross- sectional	34M 46F 44.5 (SD=9.97, range: 16-65) Recruited from an outpatient pain clinic in a hospital Chronically painful condition: Low back pain: 34%, Post-surgical pain: 21%, Arthritis: 11% 9.2 years (median:6years, inter-quartile range: 4-11.9 years)	Role-loss Attribute-loss Self-concept differentiation	Weak
Toal-Sullivan & Henderson (2004) Canada	Cohort	31M 31F Cannot tell Patients from a inpatients pain management program Chronic pain Cannot tell	Role change	Weak
Waters et al. (2004) US	Cross- sectional	41M 52 F 20-29:3.2% 30-39:7.5% 40-49:29% 50-59:30.1% 60-69:10.8% Medical center pain and palliative care clinic Chronic low back pain 8.64 years (SD=8.29)	Self-discrepancies	Moderat e

Morley et al. (2005) UK	Cross-sectional	33M 56F 45(SD=10.85) Pain clinics Chronically painful condition (19.3% back pain; 10.1% leg pain; 10.1% arthritic pain; 9% postal surgical) 114.2 month (range: 11-468)	Self-pain enmeshment Self-discrepancies	Moderate
Grumm et al. (2008) Germany	Quasi-experimental	Experimental group: 10M 17F Control group:10M 17F Experimental group: 52.0(SD=6.9) Control group: 48.5(SD=9.0) Experimental group: chronic pain patients who completed a treatment program Controls: cannot tell Chronic pain 10.8 (SD=9.4) years	Implicit self-pain association	Weak
Goossens et al. (2010) Netherlands	Cross-sectional	51M 38F 38(SD=10.74) Recruited from one rehabilitation ward in an academic hospital and one health and safety executive Having pain in the upper extremities (arm, neck, shoulder) or other a-specific pain problems at other locations 2 years (SD=0.67)	Self-discrepancies	Moderate
Compañ et al. (2011) Spain	Comparative	Clinical sample:30F Control: 30F Clinical: 49.6(SD=9.16; range: 27-61) Control:46.47(SD=7.62;range:27-60) Support groups of a fibromyalgia patients' association Fibromyalgia	Present ideal self-discrepancy Implicative dilemma	Weak

		Not given		
Costa et al. (2011) Portugal	Cross- sectional	21M 82F M: 60.81 (SD=13.24) F: 59.63 (SD=14.61) Recruited from two health units(primary care setting) and Portuguese Rheumatology Institute (tertiary care setting) Chronic pain (six months minimum)	Self-compassion	Moderat e
Huijnen et al. (2011) Netherlands	Cohort	T1: 45M 39F T1&T2: 26M 23F T1: 47.5 (SD=10.5); T1&T2: 47.8(SD=10.9); Referred by consultant: 44.6(SD=10.3); Recruited through ads in newspapers: 53.3(SD=9.0) Referred by consultant in rehabilitation medicine in 1 rehabilitation center, 6 hospital departments of rehabilitation medicine or recruited through advertisement in a local newspaper Chronic low back pain (minimum 3 months)	Self-discrepancies	Moderat e
Kindermans et al. (2011) Netherlands	Cross- sectional	41M 42F Participants referred by consultant (70%): 44.41(SE=1.31), Participants responded to ads in newspapers (30%): 52.2(SE=1.94) Referred by consultant in rehabilitation medicine or recruited through advertisement in local newspapers Chronic nonspecific low back pain (minimum 3 months)	Self-discrepancies	Moderat e
Ryckeghem et al. (2013)	Quasi- experimental	Chronic pain patients: 30M 43F Healthy controls: 18M 35F Chronic pain patients: 49.95(SD=9.76) Healthy controls: 48.53(SD=10.37)	Implicit self-pain association	Weak

Belgium		Chronic pain patients: recruited from the members of Flemish Pain League Controls: recruited via ad in a local newspaper and flyers Back pain: 90.4% neck pain: 67.1% leg pain: 65.8% arm pain: 46.6% 169.77 (SD=111.83) months		
<u>Contextual self</u>				
Wren et al. (2012) US	Cross-sectional	25M 63F 53.93 (SD=9.65) Recruited from a pain clinic Obese with persistent musculoskeletal pain 11.97 (SD=10.23) years	Self-compassion	Weak
Costa et al. (2013) Portugal	Cross-sectional	21M 82F M: 60.81 (SD=13.24) F: 59.63 (SD=14.61) Recruited from two health units(primary care setting) and Portuguese Rheumatology Institute (tertiary care setting) Chronic pain (six months minimum)	Self-compassion	Moderate
McCracken et al. (2013) UK	Cross-sectional	46M 104F 43.0 (SD=11.7) Consecutive patients seeking specialty services for chronic pain Chronic nonspecific pain: 65.7%, Fibromyalgia:18%, Other: 16.3% 94.0 months (SD=100.5)	Decentering	Good
McCracken et al. (2014)	Cross-sectional	232F 120M 47.3 (SD=11.69)	Decentering	Good

UK		Consecutive patients who attended a 4-week interdisciplinary, residential, pain management program Chronic pain (41.5% low back pain) Median: 97.0 months (interquartile range=151)		
Shadick et al. (2013)	RCT	Treatment group: 3M 36F Control: 5M 35F Treatment group: 57.8 (SD=13.8) Control: 58.5 (SD=12.0)	Self-compassion	Moderate
US		Recruited from people who were enrolled in the Brigham Rheumatoid Arthritis Sequential Study Rheumatoid Arthritis Treatment group: 18.9 (SD=10.8); Control: 13.9 (SD=9.2) years 117 (pre-posttreatment data); 78 (treatment completer: follow-up)		
Vowles et al. (2014)a	Cohort	M22 F56 45.5(SD=11.0) (treatment copmpleter)	Self-compassion	Good
UK		Consecutive referrals within an interdisciplinary pain rehabilitation service Non-specific/general pain: 47%; fibromyalgia: 16.2%; arthritis: 16.7%; sciatica: 7.1%; spondylosis: 7.1%; herniated disk: 7.1% Median: 4.4 year (range: .25 – 45.6) (completers)		
Vowles et al. (2014)b	Cross-sectional	M77 F197 51.7 (SD=14.8)	Self-compassion	Moderate
UK		Interdisciplinary pain rehabilitation service Non-specific/general pain: 71.8% ; Fibromyalgia: 15.4%; Other pain diagnosis (sciatica, peripheral neuropath, spondylosis, hypermobility): less than 4% .75-47.7 (median=7.6)		

Appendix D. Criteria for Questionnaire Assessment

Criterion 1: content validity

Content validity examines the extent to which the domain of interest is comprehensively sampled by the items in the questionnaire. A good rating was given if the items were formulated after literature study, if a clear description of the measurement aim and target population was given and if experts and patients were consulted in the item creation phase. An intermediate rating was given if a clear description of these items was lacking or if only patients were consulted. A weak rating was given if there was no evidence of involvement of the target population or experts in the development of the content of the items.

Criterion 2: internal consistency

Internal consistency refers to the extent to which items in a (sub)scale were intercorrelated, thus measuring the same construct. A good rating was given if internal consistency was established after a factor analysis had been performed among a sufficient number of subjects (seven times the number of items), and Cronbach's alphas were presented in the range between .70 and .95. An intermediate rating was given if Cronbach's alphas were presented without factor analyses or if for example a too small sample size was used in a factor analysis. A weak rating was given if Cronbach's alphas were presented below .70 or higher than .95 in spite of a good research design.

Criterion 3: criterion validity

Criterion validity is defined as the extent to which scores on a particular questionnaire relate to a "gold standard". A good rating was given if convincing arguments were given that the criterion was a gold standard and the correlation between the questionnaire and the criterion was at least .70. An intermediate rating was given if a .70 or higher correlation was presented without convincing arguments. A weak rating was given if correlations with a gold standard were below .70.

Criterion 4: construct validity

Construct validity is defined as the extent to which scores on a particular questionnaire relate to other measures in a manner that is consistent with theoretically derived hypotheses concerning the concepts

that are being measured. These hypotheses (or expectations) should be formulated explicitly and before statistical analyses. A good rating was given if 75% or more of the results were in accordance of the predefined hypotheses, an intermediate rating was given if no explicit hypotheses were predefined. A weak rating was given if despite of good research design less than 75% of the results were in accordance of the hypotheses.

Criterion 5: reproducibility: reliability

Reliability is referred to as the extent to which the same results are obtained on repeated administrations of the same questionnaire if no change in significant other variables has occurred. To measure reliability the intraclass correlation coefficient (ICC), or kappa for dichotomous or ordinal data, is considered adequate. A good rating was given if the ICC or kappa > 0.70 , an intermediate rating was given if for example no time interval was mentioned or a less valid measure than a kappa was used. A weak rating was given if despite a good research design the ICC or kappa < 0.70 .

Appendix E. Assessment Package in Study 2 & Study 3

ID: _____

INPUT Pain Management Unit

First Day Questionnaires

Guy's and St Thomas' NHS Foundation Trust

Today's date: Day: _____ Month: _____ Year: _____

Please read each question carefully, and do not spend too much time on any one question.

The questions are not meant to have right or wrong answers as such. Your answers will depend upon your circumstances. Simply reflect your experiences as openly and directly as you can.

The information that you provide in this form is confidential and anonymous. Your responses are kept in a secure location, separate to your medical notes and will not be shared with anyone outside the clinical or research team without your expressed consent.

When findings are reported for research, they will be based on combined data and no individual cases will be selected out of the data for any reason. However, you have the right to discontinue your participation or withdraw your individual information at any point.

If you have any difficulty completing these questionnaires, or any further questions, please ask a member of staff as we will be happy to help you.

INPUT 1st day measures version 1 04.01.12

DEMOGRAPHIC QUESTIONNAIRE

(Please tick the answer of your choice or provide information required)

Please state your gender: Male ☐ Female ☐

Please state your date of birth: _____

Pain History

When did your pain first start (to nearest month)? Year Month

Pain location

Where is the main or worst pain? _____

	Yes	No
Is your pain all over your body?	<input type="checkbox"/>	<input type="checkbox"/>

Please tick all the boxes where you have ANY pain:

Head, face, or mouth	<input type="checkbox"/>	1
Neck region	<input type="checkbox"/>	2
Upper shoulder or upper limbs	<input type="checkbox"/>	3
Chest region	<input type="checkbox"/>	4
Abdominal (stomach) region	<input type="checkbox"/>	5
Lower back, lumbar spine, sacrum, and coccyx (tailbone)	<input type="checkbox"/>	6
Lower limbs	<input type="checkbox"/>	7
Pelvic region	<input type="checkbox"/>	8
Anal or genital region	<input type="checkbox"/>	9

How many years of education* have you completed?

(Please provide total years completed, not school "leaving age", e.g. if you attended school from 5 to 16 years old, this would be 11 years of education.) _____ Years

What is your ethnic group? Please tick the appropriate box

White	<input type="checkbox"/>	1
Mixed	<input type="checkbox"/>	2
Black	<input type="checkbox"/>	3
Asian	<input type="checkbox"/>	4
Latin/Hispanic	<input type="checkbox"/>	5
Other	<input type="checkbox"/>	6

Do you live:

alone		1
with partner		2
with child/children		3
with partner and child/children		4
with other relatives		5
with friends/flatmates		6

What is your present job (including housewife/home-maker) or what was your last one?

.....

What is your **present** work status? Please tick **ONE** box and list hours per week if relevant:

Employed	Full time		1
	Part time due to pain		2
	Part time by choice/other reasons		3
	Volunteer/unpaid		4
	Carer		5
	Homemaker		6
Unemployed	Because of pain		7
	Unrelated to pain problems/other		8
Student/Training	Full time		9
	Part time due to pain		10
	Part time by choice/other reasons		11
Retired			12

If you are presently unemployed - how long is it since you last worked?

Years_____ Months_____

If you are currently unemployed, which of the following applies to you: (Please tick one statement)

Currently looking for work		1
Not currently looking for work but intending on working in the future		2
Not intending to work in the future		3

Yes No

Do you get sickness or disability related income?
(e.g. **disability living allowance, medical pension**)

--	--

Do you have a job to go back to?

Yes No

Are you taking legal action related to the pain now?

Pain Scale

Please indicate on the scale below the number between 0 and 10 that best describes your pain.

1. How intense is your pain *right now*?

0	1	2	3	4	5	6	7	8	9	10
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
no pain					extremely intense pain					

2. How intense was your pain *on average last week*?

0	1	2	3	4	5	6	7	8	9	10
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
no pain					extremely intense pain					

3. How distressing is your pain *right now*?

0	1	2	3	4	5	6	7	8	9	10
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
not at all distressing					extremely distressing pain					

4. How distressing was your pain *on average last week*?

0	1	2	3	4	5	6	7	8	9	10
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
not at all distressing					extremely distressing pain					

Brief Pain Inventory – Interference Scale

Circle the one number that describes how, during the past week, pain has interfered with your:

A. General Activity

☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10
Does not interfere Completely interferes

B. Mood

☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10
Does not interfere Completely interferes

C. Walking Ability

☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10
Does not interfere Completely interferes

D. Normal Work (includes both work outside the home and housework)

☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10
Does not interfere Completely interferes

E. Relations with other people

☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10
Does not interfere Completely interferes

F. Sleep

☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10
Does not interfere Completely interferes

G. Enjoyment of life

☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10
Does not interfere Completely interferes

Work and Social Adjustment Scale

Rate each of the following questions on a 0 to 8 scale: 0 indicates no impairment at all and 8 indicates very severe impairment.

1. Because of my condition, my ability to work is impaired.

0 1 2 3 4 5 6 7 8

No Impairment

Very Severe
Impairment

2. Because of my condition, my home management (cleaning, tidying, shopping, cooking, looking after home or children, paying bills) is impaired.

0 1 2 3 4 5 6 7 8

No Impairment

Very Severe
Impairment

3. Because of my condition, my social leisure activities (with other people, such as parties, bars, clubs, outings, visits, dating, home entertainment) are impaired.

0 1 2 3 4 5 6 7 8

No Impairment

Very Severe
Impairment

4. Because of my condition, my private leisure activities (done alone, such as reading, gardening, collecting, sewing, walking alone) are impaired.

0 1 2 3 4 5 6 7 8

No Impairment

Very Severe
Impairment

5. Because of my condition, my ability to form and maintain close relationships with others, including those I live with, is impaired.

0 1 2 3 4 5 6 7 8

No Impairment

Very Severe
Impairment

PATIENT HEALTH QUESTIONNAIRE (PHQ-9)

Over the *last 2 weeks*, how often have you been bothered by any of the following problems?
(use "✓" to indicate your answer)

	Not at all	Several days	More than half the days	Nearly every day
1 Little interest or pleasure in doing things	0	1	2	3
2 Feeling down, depressed, or hopeless	0	1	2	3
3 Trouble falling or staying asleep, or sleeping too much	0	1	2	3
4 Feeling tired or having little energy	0	1	2	3
5 Poor appetite or overeating	0	1	2	3
6 Feeling bad about yourself—or that you are a failure or have let yourself or your family down	0	1	2	3
7 Trouble concentrating on things, such as reading the newspaper or watching television	0	1	2	3
8 Moving or speaking so slowly that other people could have noticed. Or the opposite—being so fidgety or restless that you have been moving around a lot more than usual	0	1	2	3
9 Thoughts that you would be better off dead, or of hurting yourself in some way	0	1	2	3

10. If you checked off *any* problems, how *difficult* have these problems made it for you to do your work, take care of things at home, or get along with other people?

Not difficult at all _____
 Somewhat difficult _____
 Very difficult _____
 Extremely difficult _____

PHQ-9 is adapted from PRIME MD TODAY, developed by Drs Robert L. Spitzer, Janet B.W. Williams, Kurt Kroenke, and colleagues, with an educational grant from Pfizer Inc. For research information, contact Dr Spitzer at ris8@columbia.edu. Use of the PHQ-9 may only be made in accordance with the Terms of Use available at <http://www.pfizer.com>. Copyright ©1999 Pfizer Inc. All rights reserved. PRIME MD TODAY is a trademark of Pfizer Inc.

Committed Action Questionnaire

Directions: Below you will find a list of statements. Please rate the truth of each statement as it applies to you by circling a number. Use the following rating scale to make your choices. For instance, if you believe a statement is "Always True", you would circle the 6 next to that statement.

		0 Never True	1 Very Rarely True	2 Seldom True	3 Sometimes True	4 Often True	5 Almost Always True	6 Always True
1	I can remain committed to my goals even when there are times that I fail to reach them	0	1	2	3	4	5	6
2	When a goal is difficult to reach, I am able to take small steps to reach it	0	1	2	3	4	5	6
3	I prefer to change how I approach a goal rather than quit	0	1	2	3	4	5	6
4	I am able to follow my long terms plans including times when progress is slow	0	1	2	3	4	5	6
5	I find it difficult to carry on with an activity unless I experience that it is successful	0	1	2	3	4	5	6
6	If I feel distressed or discouraged, I let my commitments slide	0	1	2	3	4	5	6
7	I get so wrapped up in what I am thinking or feeling that I cannot do the things that matter to me	0	1	2	3	4	5	6
8	If I cannot do something my way, I will not do it at all	0	1	2	3	4	5	6

CPAQ

Directions: Below you will find a list of statements. Please rate the truth of each statement as it applies to you by circling a number. Use the following rating scale to make your choices. For instance, if you believe a statement is "Always True", you would circle the 6 next to that statement.

0 Never True	1 Very Rarely True	2 Seldom True	3 Sometimes True	4 Often True	5 Almost Always True	6 Always True
--------------------	-----------------------------	---------------------	------------------------	--------------------	-------------------------------	---------------------

1. I am getting on with the business of living no matter what my level of pain is	0	1	2	3	4	5	6
2. Although things have changed, I am living a normal life despite my chronic pain	0	1	2	3	4	5	6
3. I lead a full life even though I have chronic pain	0	1	2	3	4	5	6
4. Keeping my pain level under control takes first priority whenever I am doing something	0	1	2	3	4	5	6
5. Before I can make any serious plans, I have to get some control over my pain	0	1	2	3	4	5	6
6. When my pain increases, I can still take care of my responsibilities	0	1	2	3	4	5	6
7. I avoid putting myself in situations where pain might increase	0	1	2	3	4	5	6
8. My worries and fears about what pain will do to me are true	0	1	2	3	4	5	6

Self Experiences Questionnaire

Directions:

Below you will find a list of statements. Please rate the truth of each statement as it applies to you. Use the following rating scale to make your choices. For instance, if you believe a statement is 'Always True,' you would circle 6 next to that statement.

0	1	2	3	4	5	6
never true	very rarely true	seldom true	sometimes true	Often true	almost always true	always true
1. My thoughts and feelings overwhelm me	0	1	2	3	4	5 6
2. Although I can get caught up with my own thoughts, emotions and sensations, I can also separate myself from them	0	1	2	3	4	5 6
3. I am sensitive to changes in my feelings or emotions	0	1	2	3	4	5 6
4. I am able to step back from my emotions and observe them from a separate point of view	0	1	2	3	4	5 6
5. I am able to separate myself from my thoughts and feelings	0	1	2	3	4	5 6
6. I have thoughts and feelings but am not defined as just my thoughts and feelings	0	1	2	3	4	5 6
7. I can experience a distinction between my experiences and the "I" who notices these experiences	0	1	2	3	4	5 6
8. My life has changed and I no longer know who I am	0	1	2	3	4	5 6
9. I can actually see that I am not my thoughts	0	1	2	3	4	5 6
10. I can have a feeling and not know what it is	0	1	2	3	4	5 6
11. I experience my self as more than my thoughts and feelings	0	1	2	3	4	5 6
12. I find myself dwelling on who I used to be with a sense of loss	0	1	2	3	4	5 6
13. I am who I think I am	0	1	2	3	4	5 6
14. When my awareness of the present moment is lost I can return to it	0	1	2	3	4	5 6
15. The health, appearance, and feelings of my body change, but the sense of my self who is aware of these changes is the same	0	1	2	3	4	5 6
16. I have certain traits and qualities as a person, and these are the real me	0	1	2	3	4	5 6
17. I find myself defending who I am and cannot let it go	0	1	2	3	4	5 6
18. I feel empty as a person and distressed by this	0	1	2	3	4	5 6
19. When I feel distressed I can notice what is happening without being overwhelmed	0	1	2	3	4	5 6
20. I have the experience that important parts of who I am have been lost	0	1	2	3	4	5 6
21. I can notice what I am thinking and feeling without getting too caught up in these experiences	0	1	2	3	4	5 6
22. I feel out of touch with myself	0	1	2	3	4	5 6

23. Above all my experiences, there is a sense of my self who is noticing them	0	1	2	3	4	5	6
24. It is important that my thoughts about myself reflect who I really am	0	1	2	3	4	5	6
25. It is important that my thoughts about myself are positive	0	1	2	3	4	5	6
26. I can notice that my mind is thinking from moment to moment	0	1	2	3	4	5	6
27. I can observe experiences in my body and mind as events that come and go	0	1	2	3	4	5	6
28. I am able to remain aware of my experiences from moment to moment	0	1	2	3	4	5	6
29. My roles change depending on time, place and setting, but the sense of my self who has the roles stays the same	0	1	2	3	4	5	6

Thank you. Please check you have not missed any pages.

Appendix F. Information Sheet for Participants

Version number: 07/03/2016



Information Sheet for Participants

Project Title: The Effect of Self-As-Context on Distress Reduction in People with Chronic Pain

We would like to invite you to participate in this project. This study investigates the effect of a psychological process on the impact of pain-related experience in people with chronic pain.

What is the purpose of this project?

This is part of a PhD project at King's College London. It is hoped that this study can improve our understanding of methods that can be used for treatment of pain and improve outcomes for people with chronic pain.

Psychological treatments have been applied to chronic pain and are beneficial in terms of improving functioning of people with chronic pain. Better understanding of the therapeutic processes or mechanisms of these treatments can help improve effectiveness of treatments. In the current study, we examine the effect of one of these potential therapeutic processes. To do this we test the effectiveness of a specific technique to help people manage or better respond to unwanted thoughts and feelings.

Who are eligible to take part?

Adults (aged ≥ 18) reporting or diagnosed with fibromyalgia are eligible to participate.

What will I have to do if I agree to take part?

1. You will complete five questionnaires, rating of pain intensity, and rating of distress level.
(The study includes five short questionnaires, measures of two psychological processes which indicate your openness to pain and your sense of yourself or of your identity respectively, and measures of three outcomes including depression, interference with daily functioning in general due to pain, and specifically the impact of pain on your daily social and work activities.)
2. You will watch a video clip showing people in pain.
3. You will receive a training delivered through video (audio) for managing distress.
4. You will again complete the questionnaires and ratings of distress level.

How much of my time will participation involve?

Participation should take no more than half an hour.

Will my participation in the project remain confidential?

Appendix G. Consent Form for Participants

Version Number –13/11/15

CONSENT FORM FOR PARTICIPANTS IN RESEARCH STUDIES

Please complete this form after you have read the Information Sheet and/or listened to an explanation about the research.

Title of Study: The Effect of Self-As-Context on Distress Reduction in People with Chronic Pain



King's College Research Ethics Committee Ref: _____

Thank you for considering taking part in this research. The person organising the research must explain the project to you before you agree to take part. If you have any questions arising from the Information Sheet or explanation already given to you, please ask the researcher before you decide whether to join in. You will be given a copy of this Consent Form to keep and refer to at any time.

I confirm that I understand that by ticking/initialling each box I am consenting to this element of the study. I understand that it will be assumed that unticked/initialled boxes mean that I DO NOT consent to that part of the study. I understand that by not giving consent for any one element I may be deemed ineligible for the study.

Please tick or initial

☐

Please tick or initial

1. *I confirm that I have read and understood the information sheet dated [INSERT DATE AND VERSION NUMBER] for the above study. I have had the opportunity to consider the information and asked questions which have been answered satisfactorily. ☐
2. *I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason. Furthermore, I understand that I will be able to withdraw my data up to 2 weeks after my participation. ☐
3. *I consent to the processing of my personal information for the purposes explained to me. I understand that such information will be handled in accordance with the terms of the UK Data Protection Act 1998. ☐
4. *I understand that my information may be subject to review by responsible individuals from the College for monitoring and audit purposes. ☐
5. I understand that confidentiality and anonymity will be maintained and it will not be possible to identify me in any publications ☐
6. I agree that the research team may use my data for future research and understand that any such use of identifiable data would be reviewed and approved by a research ethics committee. (In such cases, as with this project, data would/would not be identifiable in any report). ☐

7. I understand that the information I have submitted will be published as a report.

☐

8. I understand that I must not take part if I fall under the exclusion criteria as detailed in the information sheet and explained to me by the researcher.

☐

Name of Participant

Date

Signature

Appendix H. Script for Trainings in Study 4

Self-as- context training

For this part of the experiment, find a time and situation where you can focus without being interrupted and sit comfortably. When you are ready, close your eyes and listen to the sound of my voice. For now, focus your attention on your breathing. Feel the rise and fall of your chest with each in-breath and out-breath you take. Notice the sensations of inhaling and exhaling. And then, ... notice that you are the one who is noticing your breathing. When you are ready, bring your attention to the thoughts going through your mind in this moment. See how well you can let the thoughts show up, whatever kind they are, and let them go again. What thought are you having right now? As well as you can, notice the thought that you are having, observe it, and then let it go again. And, now, what thought appears? Notice the thought that you are having, observe it, and let it go. And then... notice that you are the one who is noticing your thoughts. There goes your thought... and there you are noticing it.

Now from a point of view that is separate from your thoughts and feelings, notice a sense in which you are always bigger than your thoughts and feelings. Imagine what the sky and weather are like. Now notice, in your current experience, a sense in which you are like the sky ... and your thoughts and feelings are like the weather. The weather changes continually, from clear, warm, sunny and comfortable to gloomy, cold, dark, and stormy. Notice that no matter how bad the weather is, the sky always has room for it. No matter how the weather changes, up above the thickest clouds there is always the sky, clear, stretching in all directions. Notice again this particular sense in which the sky is bigger than the weather. It is where the weather happens. The weather is contained in the sky. See if you can notice this same sense with you and your thoughts and feelings. See if you can connect with this sense that you are “above” and “bigger” than your thoughts and feelings..., maybe like you are the arena where your thoughts and feelings happen, or, you contain them. Notice this kind of perspective as an actual experience, a sense that you are separate from, longer lasting, bigger than, and containing that contents of what you think and feel.

Now bring your attention back to your breathing, allowing it to follow its own natural rate. When you are ready, open your eyes.

Control and suppression training

For this part of the experiment, find a time and situation where you can focus without being interrupted and sit comfortably. When you are ready, close your eyes and listen to the sound of my voice. For now, focus your attention on your breathing. Feel the rise and fall of your chest with each in-breath and out-breath you take. Notice the sensations of inhaling and exhaling. When you are ready, bring your attention to the content of your thoughts going through your mind in this moment. Notice carefully the content of your thoughts. Be aware of the content of your thoughts. What are you thinking of right now? As well as you can, notice your thoughts, be aware, and allow yourself to keep following your train of thoughts. And now what thought shows up? As well as you can, notice it, be aware, notice what your thoughts are about.

Now imagine what it is like to walk under the sky in changing weather. Now notice, in your current experience, a sense in which your thoughts and feelings are like the weather, and you are standing under the sky and exposed to this weather. The weather changes continually, from clear, warm, sunny and comfortable to gloomy, cold, dark, and stormy. Notice no matter how the weather changes, some effect on you happens, comfortable or uncomfortable... See how well you can directly experience right now that this is the way it is with the weather. And now see if this is also how it is with thoughts and feelings. No matter how our thoughts and feelings change, some effect on us happens, good or bad. Now imagine that you get caught in bad weather. One thing you may do when this happens is to try to prevent, reduce, or not experience the negative effect that the bad weather has on you, running away from it, taking shelter, or even fighting against it. Notice, in the same sense, that when you get caught in negative thoughts and feelings, you can resist, ignore them, cover them up, or even fight against them to reduce or not experience the effect these negative thoughts and feelings have on you. Notice this particular sense in which you have done this and can do this, running away or fighting against "the weather," the weather made up of the thoughts and feelings that you do not want to touch, that make you uncomfortable, or worse.

Now bring your attention back to your breathing, allowing it to follow its own natural rate. When you are ready, open your eyes.

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